

# Revision of *Polyrhachis* (*Hagiomyrma*) Wheeler, 1911 (Insecta: Hymenoptera: Formicidae: Formicinae)

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## ABSTRACT

The subgenus *Hagiomyrma* Wheeler, 1911, of the genus *Polyrhachis* Fr. Smith, 1857, is revised. Forty-eight species are recognised, including sixteen previously described species: *P. ammon* (Fabricius), *P. ammonoeides* Roger, *P. angusta* Forel, *P. crawleyi* Forel, *P. denticulata* Karavaiev, *P. lachesis* Forel, *P. lydiae* Forel, *P. metella* Fr. Smith, *P. paxilla* Fr. Smith, *P. penelope* Forel, *P. schenkii* Forel, *P. semiaurata* Mayr, *P. semiobscura* Donisthorpe, *P. thusnelda* Forel, *P. trapezoidea* Mayr and *P. tubifera* Forel. Thirty-two species are described as new: *P. anderseni*, *P. archeri*, *P. aurora*, *P. bohemia*, *P. brisbanensis*, *P. brutella*, *P. burwelli*, *P. callima*, *P. capeyorkensis*, *P. clarki*, *P. conciliata*, *P. cracenta*, *P. darlingtoni*, *P. diversa*, *P. dougcooki*, *P. electra*, *P. elegantula*, *P. feehani*, *P. hoffmanni*, *P. injinooi*, *P. isolata*, *P. melanura*, *P. nourlangie*, *P. pilbara*, *P. placida*, *P. seducta*, *P. stricta*, *P. tanami*, *P. tenebra*, *P. uncaria*, *P. vernoni* and *P. weiri*. Six species-groups are recognised: *P. ammon*-group, *metella*-group, *penelope*-group, *schenkii*-group, *trapezoidea*-group and *tubifera*-group. Three species, *Polyrhachis sokolova* Forel, *P. trophima* Fr. Smith and *P. xiphias* Fr. Smith, formerly placed in *Hagiomyrma* are excluded and placed in different subgenera. A key based on the worker caste is provided. All species are illustrated and their known distributions and biology and ecology summarised. □ *Polyrhachis*, *Hagiomyrma*, *Australia*, *New Guinea*, *systematics*, *new species*, *distribution*.

This is the fourth in a series of papers reviewing the Australian ants of the genus *Polyrhachis* (Kohout 2006, 2010, 2012). It deals with the species of the subgenus *Hagiomyrma* which is confined to the Australasian Region with the majority of species restricted to Australia. In terms of the Australian fauna, *Hagiomyrma* is the third most speciose subgenus of *Polyrhachis* with only *Charionomyrma* and *Camponomyrma* containing more Australian species.

In 1775 Johann Christian Fabricius described *Formica ammon*, one of the first Australian ants collected at Botany Bay by Joseph Banks during the *Endeavour* voyage of discovery under Captain James Cook. However, it was not until almost a century later that Frederick Smith (1860 and 1863) and Julius Roger (1863) described

five more species that were later considered members of the subgenus *Hagiomyrma*. In the following years (1866, 1870 and 1876) Gustav Mayr described a further thirteen *Polyrhachis* species and subspecific forms, mostly from the material in the Godeffroy Museum in Hamburg, two of which now belong to *Hagiomyrma*. However, the work of Auguste Forel had the greatest impact on the taxonomy of the *ammon*-group, that later (see Wheeler, 1911) become known as the subgenus *Hagiomyrma*. Except for two species, one he described in 1886 from Darnley Island in Torres Strait and the other in 1907 from the north-west of Western Australia, all the specimens he worked on were collected and sent to him by Gilbert Turner, a retired farmer from Mackay in Queensland

(see Turner, 1897). From this material, between 1895 and 1916, Forel described a vast number of new species and subspecies of Australian ants, including ten which were considered members of the subgenus *Hagiomyrma*. Only two more species, *P. denticulata* Karavaiev, 1927, and *P. semiobscura* Donisthorpe, 1944, were later described, raising the number of *Hagiomyrma* species to twenty-two. This situation remained unchanged until Kohout (1988, 1994) synonymised the subspecies *P. annoni angustata* Forel and *P. sokolova degeyer* Forel with their nominal forms and *P. chalcas* Forel with *P. ammonoeides* Roger, reducing the number of species to nineteen. Finally, with the transfer of three species to different subgenera (see below), I consider only sixteen previously described species to be valid members of the subgenus *Hagiomyrma*.

## MATERIAL AND METHODS

Photographs of specimens were taken with a digital camera attached to a stereomicroscope. The images were then processed using Helicon Focus (Mac OSX version) or Auto-Montage (Syncroscopy, Division of Synoptics Ltd, USA) and Adobe Photoshop CS2 (Adobe Systems Inc., USA) software. Unless otherwise indicated, illustrations are of the holotypes of the new species or critically compared specimens (mostly topotypes) of previously described species.

The use of the terms "New Guinea", "New Britain", "New Ireland" and "Bismarck Archipelago" alone indicate the biogeographic delimitation of these regions regardless of their current political boundaries. New Guinean localities at which ants were collected by the Bishop Museum's collectors were checked against that institution's locality list (BPBM, 1966, unpublished). In some cases the latitude and longitude co-ordinates and altitudes of localities are only approximate.

Lists of synonymies presented here are not always comprehensive and for full synonymic citations see Bolton (1995), Bolton *et al.* (2007) and Dorow (1995). Publication dates and the spelling of species' and authors' names generally follow Bolton *et al.* (2007). Where a holotype specimen is mentioned as 'unique',

this infers that this was the only specimen available and no syntype or paratype specimens are known to exist.

Names of the most frequently listed collectors are abbreviated as follows: ANA = A.N. Andersen; BDH = B.D. Hoffmann; CJB = C.J. Burwell; DJC = D.J. Cook; DKY = D.K. Yeates; GIT = G.I. Thompson; H&C = H. Heatwole & E. Cameron; JDM = J.D. Majer; JEF = J.E. Feehan; JPH = J. & P. Hasenpusch; PMR = P.M. Room; RJK = R.J. Kohout; BBL = B.B. Lowery; GBM = G.B. Monteith; SKR = S.K. Robson; RWT = R.W. Taylor; TAW = T.A. Weir. Other abbreviations used in specimen data are: Arch. = Archipelago; Bch = Beach; c. = about (*L. circa*); CALM = Department of Conservation and Land Management, Western Australia; Ck = Creek; CURT = Curtin University of Technology, Perth, Western Australia; DPI = Department of Primary Industries; Hmsd = Homestead; I. = Island; Is = Islands; Mt = Mount; Mtn = Mountain; Mts = Mountains; NP = National Park; nr = near; Pen. = Peninsula; Pltn = Plantation; PNG = Papua New Guinea; Prov. = Province; Pt = Point; R. = River; Ra. = Range; Rd = Road; rf. = rainforest; SF = State Forest; Stn = Station; Tblld = Tableland; TERC = CSIRO, Tropical Ecosystems Research Centre, Darwin, Northern Territory; w = worker/s; x-ing = crossing. Australian states and territories are abbreviated as follows: ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; QLD = Queensland; SA = South Australia; TAS = Tasmania; VIC = Victoria; WA = Western Australia.

Abbreviations for institutions and depositories (with the names of co-operating curators) are: AMNH – American Museum of Natural History, New York, NY, USA. (Dr J.M. Carpenter); AMSA – Australian Museum, Sydney, NSW, Australia (Drs D. Britton, D. Smith); ANIC – Australian National Insect Collection, CSIRO Ecosystem Sciences, Canberra, ACT, Australia (Drs S.O. Shattuck, R.W. Taylor, N. Barnett); BMNH – The Natural History Museum, London, UK (Barry Bolton, K. Goodger, S. Ryder); BPBM – Bernice P. Bishop Museum, Honolulu, HI, U.S.A. (Dr G.M. Nishida, K.T. Arakaki); CASC – California



Academy of Sciences, San Francisco, CA., U.S.A. (Dr B.L. Fisher, K.J. Ribardo); CURT – Curtin University of Technology, Perth, WA, Australia (Drs J.D. Majer, B.E. Heterick); HNHM – Hungarian Natural History Museum, Budapest, Hungary (Dr J. Papp); IZAS – Institute of Zoology, Ukrainian Academy of Sciences, Kiev, Ukraine (Dr A.G. Radchenko); MCZC – Museum of Comparative Zoology, Harvard University, Cambridge, MA., USA (Dr S.P. Cover); MHNG – Muséum d'Histoire Naturelle, Geneva, Switzerland (Drs C. Besuchet, I. Löbl, B. Merz); MNHA – Museum of Nature and Human Activities, Sanda, Hyogo, Japan (Dr Yoshiaki Hashimoto); MNHN – Muséum National d'Histoire Naturelle, Paris, France (Dr J. Casevitz Weulersse); MNHU – Museum für Naturkunde, Humboldt-Universität, Berlin, Germany (Dr F. Koch, A. Kleine-Möllhoff); MSGG – Civic Museum of Natural History 'G. Doria', Genova, Italy (Drs R. Poggi, F. Penati); MVMA – Museum of Victoria, Melbourne, VIC., Australia (Dr A. Neboiss, K. Walker); NHMB – Naturhistorisches Museum, Basel, Switzerland (Drs M. Brancucci, D.H. Burckhardt); NHMW – Naturhistorisches Museum, Vienna, Austria (Drs M. Fischer, S. Schödl, H. Zettel); NHRS – Naturhistoriska Riksmuseet, Stockholm, Sweden (Drs K.-J. Hedquist, F. Ronquist); NMNH – National Museum of Natural History, Smithsonian Institution, Washington, DC, USA (Drs T.R. Schultz, D.R. Smith); OXUM – University Museum, Oxford, UK (Drs C. O'Toole, D.J. Mann); QM – Queensland Museum, Brisbane, QLD, Australia (Drs C.J. Burwell, G.B. Monteith); SAMA – South Australian Museum, Adelaide, SA, Australia (A. McArthur); TERC – Tropical Ecosystems Research Centre, CSIRO Sustainable Ecosystems, Darwin, NT, Australia (Dr A.N. Andersen); WAMP – Western Australian Museum, Perth, WA, Australia (Dr T. Houston); ZMSG – Zoologische Staatssammlung, München, Germany (Dr E. Diller).

The following standard measurements and indices are used: TL – Total length (the necessarily composite measurement of entire ant measured in profile); HL – Head length

(maximum measurable length of the head in perfect full face view, measured from the anteriormost point of the clypeal border or teeth, to the posteriormost point of the occipital margin); HW – Head width (width of the head in perfect full face view, measured immediately in front of eyes); CI – Cephalic index ( $HW \times 100/HL$ ); SL – Scape length (length of the antennal scape, excluding the condyla); SI – Scape index ( $SL \times 100/HW$ ); PW – Pronotal width (maximum width of the pronotal dorsum measured in dorsal view); MTL – Metathoracic tibial length (maximum measurable length of the tibia of the hind leg).

Because of variability in the shape of the promesonotal dorsum, resulting from the posterior convergence of the lateral margins of the pronotum and mesonotum, MW, the minimum width of the mesonotal dorsum measured along the metanotal groove when viewed from behind, was added to the standard set of measurements. Its comparison with the greatest width of the pronotal dorsum, using the formula  $PW \times 100/MW$  (= PMI, the promesonotal index) provides a valuable tool to compare the shape of the promesonotal dorsum between species. The PMI proved to be one of the important identification characters for species of *Hagiomyrma*. However, for a number of types examined in the early stages of this study the MW was not measured and consequently PMI is not available for those specimens.

All measurements were taken using a Zeiss SR stereomicroscope at 20x and 32x magnifications with an eyepiece graticule calibrated against a stage micrometer. All measurements are expressed in millimetres (mm).

## SYSTEMATICS

### *Polyrhachis* Fr. Smith, 1857

*Polyrhachis* Fr. Smith, 1857: 58. Type species: *Formica bhamata* Drury, 1773: 73, pl. 38, figs 7, 8, worker; by original designation.

### *Hagiomyrma* Wheeler, 1911

*Hagiomyrma* Wheeler, 1911: 860 (as subgenus of *Myrma* Billberg, 1820 [sensu Wheeler, 1911: 859] = *Polyrhachis*

- Fr. Smith, 1857). Type species: *Formica ammon* Fabricius, 1775: 394, worker; by original designation.
- Hagiomyrma* Wheeler; Forel, 1915: 106. As subgenus of *Polyrhachis* Fr. Smith, 1857.
- Hagiomyrma* Wheeler; Wheeler, 1922: 702. Diagnosis in a key. As subgenus of *Polyrhachis* Fr. Smith, 1857.
- Hagiomyrma* Wheeler; Emery, 1925: 184. Diagnosis of subgenus. As subgenus of *Polyrhachis* Fr. Smith, 1857.
- Hagiomyrma* Wheeler; Hung, 1967: 398; Dorow, 1995: 24; Bolton, 1995: 30. As subgenus of *Polyrhachis* Fr. Smith, 1857.

*Hagiomyrma* was originally established by Wheeler (1911a: 860) as the fourth subgenus within the genus *Myrma* Billberg, 1820 (see Dorow *et al.* 1997: 236–241). Wheeler used the subgeneric combination of *Myrma* (*Polyrhachis*) repeatedly (Wheeler 1911b, 1912) and proposed several new combinations, e.g. *Formica sexspinosa* Latreille (1802) or *Formica ammon* Fabricius (1775), that he cited as '*Myrma* (*Polyrhachis*)' and '*Myrma* (*Hagiomyrma*)' respectively. Forel (1915) strongly objected to Wheeler's proposed nomenclature and claimed support from then prominent myrmecologists Emery and Santschi. Subsequently, without explanation, Wheeler (1915: 821–823) evidently abandoned his position and cited *Polyrhachis* at generic rank in all his following papers (Wheeler 1919, 1922 *etc.*).

**Diagnosis.** *Hagiomyrma* is one of the relatively well-defined subgenera of the genus *Polyrhachis*. A marginate mesosomal dorsum, mostly rounded pronotal humeri and more-or-less horizontal, posteriorly directed propodeal spines, make most members of this subgenus easily recognisable (see a key to workers of the Australian subgenera of *Polyrhachis* in Kohout 2010: 169–171, fig. 1).

**Description.** *Worker*: Small to moderately large ants (HL 1.30–2.80) with general characteristics of the genus. Anterior clypeal margin usually with distinct, denticulate, median flange (as in *P. ammon*), simply truncate (as in *P. anderseni* sp. nov.) or with deep, open, 'V'-shaped emargination (as in *P. metella* Fr. Smith). Clypeus with median, longitudinal carina; sinuate or straight in profile. Frontal carinae sinuate with moderately raised margins at midlength; central area relatively wide with more-or-less distinct frontal furrow or weakly raised carina. Dorsum of mesosoma distinctly

laterally marginate along its entire length. Pronotal dorsum generally near quadrate with lateral margins subparallel or converging posteriorly (as in *P. schenkii* Forel, *P. trapezoidea* Mayr or *P. weiri* sp. nov.); more rarely margins anteriorly converging (strongly as in *P. metella* Fr. Smith or weakly as in *P. darlingtoni* sp. nov., *P. dongcooki* sp. nov. and *P. feehani* sp. nov.). Pronotal humeri unarmed with margins weakly to moderately laminate, often dilated, widely or narrowly rounded or more rarely bluntly angular (as in *P. schenkii* Forel and *P. vernoni* sp. nov.). Promesonotal suture distinct; metanotal groove often distinct laterally, but weakly impressed dorsally, or virtually lacking. Propodeum armed with a pair of more-or-less horizontal, subparallel or divergent, acute spines. Petiole scale-like or rarely columnar (as in *trapezoidea*-group species), armed with a pair of acute spines that can be subparallel or divergent, horizontal or curved downwards (as in *P. uncaria* sp. nov.), upwards (as in *P. stricta* sp. nov.), or re-curved and hook-like (as in *P. ammonoides* Roger); dorsum narrowly rounded or rarely with flat platform that can be horizontal (as in *P. thusnelda* Forel) or sloping posteriorly (as in *P. trapezoidea* Mayr, *P. darlingtoni* sp. nov. and *P. nourlangie* sp. nov.).

*Queen*. Very similar to worker, with usual characters identifying full sexuality, including three ocelli and complete thoracic structure with wings. Besides larger size (except in *P. semiaurata* Mayr), differing in distinctly larger eyes and distinctly shorter propodeal and petiolar spines. Sculpturation, pilosity, pubescence and colour virtually identical to that in worker.

*Male*. Males are unknown for most of the species and as such their treatment was not attempted here. However, where known, their presence in collections is indicated under each species.

**Distribution and biology.** *Hagiomyrma* can be considered the most 'Australian' subgenus of *Polyrhachis*, with almost all of its constituent species endemic to Australia. Only four of the presently recognised 48 species were originally described from beyond the Australian



mainland, with three of them, *P. denticulata* Karavaiev, *P. schenkii* Forel and *P. semiobscura* Donisthorpe, reported from Australia in recent years (Kohout & Taylor 1990: 514, 519), while the fourth species, *P. metella* Fr. Smith, appears to be endemic to New Guinea. The distributions of most *Hagiomyrma* species are centred on coastal Queensland, however, some (e.g. *P. anumonoides* Roger, *P. pilbara* sp. nov.) occur only in north-western Western Australia, while the ranges of several others (e.g. *P. crawleyi* Forel, *P. schenkii* Forel) extend along the northern Australian coastline from the Kimberley region in the west to Cape York Peninsula in the east. Only four species follow the eastern Australian seaboard from Queensland south to central New South Wales, with two (*P. ammon* and *P. semiaurata* Mayr) reaching as far south as Victoria and one of them (*P. ammon*) extending westwards to the Australian Capital Territory.

Most species seemingly prefer open *Eucalyptus* forests and savannah woodlands. However, two new species were most recently recorded from the spinifex grasslands of central Australia, with one from the Tanami Desert and the other from the MacDonnell Ranges. In stark contrast, two species, *P. diversa* sp. nov. and *P. vernoni* sp. nov., are rainforest dwelling species. Virtually all known species of the subgenus, except the apparently lignicolous *P. semiobscura* Karavaiev, are ground-nesting (both terrestrial and subterranean) and their nesting habits were discussed in detail by Kohout (1997) and Robson & Kohout (2007). The lithocolous nesting habit of *P. thusnelda* Forel was reported by Robson & Kohout (2005) and a similar nesting habit inside rock crevices has recently been discovered in *P. anderseni* sp. nov. (Kohout unpublished).

#### TAXA EXCLUDED FROM *P. HAGIOMYRMA*

The following three species that have been previously included within the subgenus *Hagiomyrma* are here excluded and placed in different subgenera.

#### *Polyrhachis* (*Chariomyrma*) *sokolova* Forel, 1902 comb. nov.

*Polyrhachis sokolova* Forel, 1902: 522. Syntype workers.  
Type locality: AUSTRALIA, QLD, Mackay (G. Turner), MHNG (examined) (transferred to subgenus *P. (Chariomyrma)* Forel). New combination.

**Remarks.** When describing *Polyrhachis sokolova*, Forel indicated that it belonged to the *ammon*-group and, consequently, Emery (1925) and all subsequent authors treated it as a member of the subgenus *Hagiomyrma*. However, *P. sokolova* features laminate pronotal margins with acutely spinose humeri, a character common to species of the subgenus *Chariomyrma* Forel. In fact, small specimens of *P. sokolova* ('var. *degener*') are remarkably similar to *Polyrhachis constricta*, described by Emery from Australia in 1897, and subsequently placed by him in the subgenus *Chariomyrma* (Emery 1925: 186). *Polyrhachis sokolova* is a quite common species that also occurs beyond the Australian mainland, with records from the Aru Islands, the southern coast of Papua and New Caledonia. Specimens from the Northern Territory differ in several characters from those from Queensland and were earlier considered a separate, undescribed species (see Kohout 1988: 436; Nielsen 1997: 16). However, subsequent examination and comparison of Northern Territory specimens with others from throughout the range of *P. sokolova*, has shown no taxonomically significant variability to justify their separate specific status. At many localities in the Northern Territory, *P. sokolova* is sympatric with *P. constricta* and their undeniable similarity resulted in Andersen (2000) correctly listing both species under the subgenus *Chariomyrma*.

#### *Polyrhachis* (*Hedomyrma*) *trophima* Fr. Smith, 1863 comb. nov.

*Polyrhachis trophimus* Fr. Smith, 1863: 14. Holotype worker.  
Type locality: INDONESIA, Seram I. (A.R. Wallace), OXUM (examined) (transferred to subgenus *P. (Hedomyrma)* Forel). New combination.

**Remarks.** *Polyrhachis trophima* was placed by Dalla Torre (1893: 271), Emery (1925: 185) and Chapman & Capco (1951: 267) in the subgenus *Hagiomyrma* and by Donisthorpe (1932: 469), Bolton (1995: 359) and Dorow (1995: 21) in the subgenus *Chariomyrma*. I have examined

the unique holotype of *P. trophima* and found it remarkably similar to *P. calliope* Emery, a species described in 1900 from New Guinea. It features pronotal humeri armed with short, but distinct spines and a petiole with a flat dorsum, a combination of characters identifying members of the subgenus *Hedomyrma* Forel.

***Polyrhachis (Campomyrma) xiphias* Fr.  
Smith, 1863 comb. nov.**

*Polyrhachis xiphias* Fr. Smith, 1863: 16. Holotype queen. Type locality: INDONESIA, Waigiou I. (= Pulau Waigeo) (A.R. Wallace), OXUM (examined) (transferred to subgenus *P. (Campomyrma)* Wheeler). New combination.

**Remarks.** *Polyrhachis xiphias* was described from a single queen and subsequently placed by Emery (1925: 185) in the subgenus *Hagiomyrma*. Only following the recent identification of worker specimens was *P. xiphias* recognised as a member of the subgenus *Campomyrma* Wheeler. It became the name-bearing species of the *Polyrhachis xiphias*-group (Kohout 2007: 7), a small group of species within *Campomyrma*, which also includes *P. hashimotoi* Kohout from Borneo and *P. shixingensis* Wu & Wang from China. The members of this group differ from other *Campomyrma* species by having the petiolar node columnar and the dorsum armed with two, more-or-less horizontal, posteriorly directed spines, in contrast to the scale-like petiole of all other known *Campomyrma* species.

## THE SPECIES-GROUPS

The subgenus *Hagiomyrma* had never been formally subdivided (Emery 1925; Dorow 1995) until Andersen (2000) introduced four species-groups pertinent to his work on the ants of monsoonal Australia. He recognised the *ammon*-group, *schenkii*-group, *trapezoidea*-group and an unnamed 'Group A', that he distinguished mostly by the shape of the petiolar dorsum, the comparative length of the petiolar and propodeal spines, the length of the antennal scapes and the colour of the body. Three more species-groups are proposed here, the *metella*-group, the *penelope*-group and the *tubifera*-group, with Andersen's 'Group A' incorporated within the *trapezoidea*-group. Most of these groups intergrade on morphological

grounds and within the groups the species tend to polarise into several complexes.

Andersen (2000) included two species, *P. ammon* and *P. angusta*, within the *ammon*-group which is expanded here to incorporate 16 species. It includes most of the larger species of the subgenus (generally HL > 1.90) which have promesonotal lateral margins that are only weakly converging posteriorly (PMI < 160) and generally hairless scapes. The species have uniformly black ground colour which is often obscured by golden or silvery pubescence. The dorsum of the gaster is usually covered with rich, golden pubescence (except in *P. semiaurata* Mayr) with a rather distinct, very dark, reddish-brown, median patch in the species of the *callina*-complex (e.g. Fig. 2G-H), or without a dark patch in the species of the *ammon*-complex (e.g. Fig. 1A-B). Most species of the *ammon*-group have a scale-like petiolar node, however, *P. burwelli* sp. nov. has a columnar petiole with a widely rounded dorsum (Fig. 2F). The majority of *ammon*-group species tend to be stoutly built, but some species closely related to *P. ammonoeides* Roger and *P. angusta* Forel (*ammonoeides*-complex) are more slender and elongate and feature distinctly dilate pronotal humeri and rather long, widely divergent, propodeal spines (e.g. Fig. 3C-D). *Polyrhachis ammonoeides* has hairs along the antennal scapes and somewhat more distinct sculpturation, and so is intermediate between the *ammon*-group and the *pilbara*-complex of the newly proposed *penelope*-group (see below).

*Polyrhachis tubifera* Forel, previously placed in the *ammon*-group by Andersen (2000), is here included, with *P. diversa* sp. nov., in a new *tubifera* species-group characterised by a distinctly short and broad mesosomal dorsum, propodeal spiracles situated on relatively long, laterally projecting tubercles and very short propodeal and petiolar spines (Fig. 14A-B, C-D).

The *schenkii*-group, as conceived by Andersen (2000), includes mostly reddish-coloured species with the leading edge of the antennal scapes fringed with short, bristle-like hairs (except in *P. bohemia* sp. nov.) and relatively



coarsely reticulate or vermiculate-punctate body sculpturation. Besides *P. schenkii* Forel, *P. lachesis* Forel and *P. lydiae* Forel, listed by Andersen (2000), the group also includes *P. paxilla* Fr. Smith and several newly described species. Within the group species tend to polarise into two complexes, centring on either *P. schenkii* or *P. lachesis*. Species allied to *P. schenkii* are smaller (HL < 1.90), with strongly posteriorly converging promesonotal margins (PMI  $\pm$  200) and finer sculpturation. In contrast, the species more closely related to *P. lachesis*, are larger (HL  $\pm$  2.00), with the promesonotal margins less strongly converging posteriorly (PMI < 185) and with more-or-less distinct, vermiculate-rugose sculpturation.

The *trapezoidea*-group was proposed by Andersen (2000) to accommodate *P. trapezoidea* and 'a few species of *Hagiomyrma*' with a 'dorsally flattened petiolar node'. Besides *P. trapezoidea* Mayr, only two other species, *P. thusnelda* Forel and the more distantly related *P. metella* Fr. Smith, feature a high columnar petiole with a distinctly flat dorsum. Two other species, *P. darlingtoni* and *P. nourlangie*, feature a distinctly low and broad petiole with a somewhat flat dorsum and very short petiolar spines (Fig. 13A-B, C-D). These latter species also agree with Andersen's (2000) definition of his 'Group A', that constituted mostly 'smaller, more gracile species with very reduced petiolar spines'. *Polyrhachis nourlangie* is 'endemic to sandstone escarpments of the northern Top End' and is undoubtedly the species Andersen was referring to when proposing his new group. *Polyrhachis darlingtoni* and *P. nourlangie* are closely related and form a distinct *darlingtoni*-complex within the *trapezoidea*-group.

*Polyrhachis metella* has always been a difficult species to place. With its strongly anteriorly converging pronotal margins, rather long and slender propodeal and petiolar spines, very high declivity and flat-topped petiole (Figs 5A-B), it resembles some members of *Hedomyrma* and can be considered an intermediate between that subgenus and *Hagiomyrma*. It is clearly unrelated to other species of the *trapezoidea*-group and is consequently placed into a newly proposed *metella*-group.

Most of the smaller species of the subgenus (HL < 1.90) are incorporated into the newly proposed *penelope*-group. Besides their smaller size and black body colour, most species have golden or silvery pubescence fairly evenly distributed over the gastral dorsum (except *P. electra* sp. nov.) or have virtually no gastral pubescence (e.g. Fig. 6E). Consequently most species lack a median patch on the gastral dorsum as seen in species within the *annun*-group. The species of the *penelope*-group can be divided into three complexes. Species in the *pilbara*-complex are characterised by bristle-like hairs along the antennal scapes and rather coarsely reticulate-punctate body sculpturation (e.g. Fig. 8C). In contrast, species of the *anderseni*- and *penelope*-complexes lack antennal hairs and their body sculpture is distinctly more finely, reticulate-punctate. Also, species in the *anderseni*-complex have the bases of petiolar spines closely approximate and the dorsum of petiole transversely narrow and medially concave (Fig. 6A). Species in the *penelope*-complex, feature widely divergent petiolar spines and a transversely wide and virtually straight petiolar dorsum (e.g. Figs 6E, 8A).

## CHECKLIST OF HAGIOMYRMA SPECIES

The following list includes all described *Hagiomyrma* species, with their synonyms indented.

POLYRHACHIS (HAGIOMYRMA)  
AMMON SPECIES-GROUP

- ammon* (Fabricius, 1775)  
*ammon angustata* Forel, 1902  
*ammonoeides* Roger, 1863  
*chalchas* Forel, 1907  
*angusta* Forel, 1902  
*aurora* sp. nov.  
*brisbanensis* sp. nov.  
*brutella* sp. nov.  
*burwelli* sp. nov.  
*callima* sp. nov.  
*councilata* sp. nov.  
*cracenta* sp. nov.  
*dougcooki* sp. nov.  
*elegautula* sp. nov.  
*feehani* sp. nov.  
*semiaurata* Mayr, 1876  
*uncaria* sp. nov.  
*vernoni* sp. nov.

POLYRHACHIS (HAGIOMYRMA) METELLA  
SPECIES-GROUP

- metella* Fr. Smith, 1860

POLYRHACHIS (HAGIOMYRMA) PENELOPE  
SPECIES-GROUP

- anderseni* sp. nov.  
*archeri* sp. nov.  
*clarki* sp. nov.  
*crawleyi* Forel, 1916  
*denticulata* Karavaiev, 1927  
*electra* sp. nov.  
*hoffmanni* sp. nov.  
*melanura* sp. nov.  
*penelope* Forel, 1895  
*pilbara* sp. nov.  
*placida* sp. nov.  
*seducta* sp. nov.  
*semiobscura* Donisthorpe, 1944  
*stricta* sp. nov.  
*tanami* sp. nov.  
*tenebra* sp. nov.  
*weiri* sp. nov.

POLYRHACHIS (HAGIOMYRMA) SCHENKII  
SPECIES-GROUP

- bohemia* sp. nov.  
*capeyorkensis* sp. nov.  
*injinooi* sp. nov.  
*isolata* sp. nov.  
*lachesis* Forel, 1897  
*lydiae* Forel, 1902  
*paxilla* Fr. Smith, 1863  
*schenkii* Forel, 1886

POLYRHACHIS (HAGIOMYRMA) TRAPEZOIDEA  
SPECIES-GROUP

- darlingtoni* sp. nov.  
*nourlaugie* sp. nov.  
*thusnelda* Forel, 1902  
*trapezoidea* Mayr, 1876

POLYRHACHIS (HAGIOMYRMA) TUBIFERA  
SPECIES-GROUP

- diversa* sp. nov.  
*tubifera* Forel, 1902

KEY TO SPECIES OF POLYRHACHIS  
(HAGIOMYRMA)

(based on worker caste)

1. Generally larger species (HL > 2.20) 2.  
 — Generally medium-sized or small species (HL < 2.15) ..... 14.
2. Pronotal dorsum with margins strongly converging anteriorly (Fig. 5A); occipital corners with distinct postocular carinae; anterior clypeal margin deeply emarginate medially (New Guinea and Bismarck Archipelago). . . . . *P. metella* Fr. Smith  
 — Pronotal dorsum more-or-less quadrate or only weakly converging anteriorly (e.g. Figs 2E, 4A); occipital corners simply rounded, without postocular carinae; anterior clypeal margin medially with denticulate flange or simply truncate. . . . 3
3. Gaster with pubescence very much diluted, virtually lacking; head and



- mesosoma with long, rich golden pubescence (Fig. 4C-D) (QLD, NSW, VIC) ..... *P. semiaurata* Mayr
- Gaster with golden or silvery pubescence identical or similar to that on dorsum of head and mesosoma ..... 4
4. Pronotal humeri distinctly angular (Fig. 4G); dorsum of first gastral tergite strongly transverse, laterally produced into narrowly rounded prominences (Cape York Pen., Mt Tozer, QLD) ..... *P. vernoni* sp. nov.
- Pronotal humeri narrowly or widely rounded (e.g. Fig. 2C, E); dorsum of first gastral tergite less transverse, with sides widely rounded ..... 5
5. Petiolar node relatively thick in profile with dorsum widely rounded or forming more-or-less flat platform; petiolar spines short, bases situated well below summit of dorsal convexity (Figs 2F, 13B) ..... 6
- Petiolar node in profile with anterior and posterior face converging towards narrowly rounded dorsum; petiolar spines longer, bases situated at lateral corners of dorsal summit (e.g. Fig. 1B, H) ..... 7
6. Pronotal dorsum with margins weakly converging anteriorly; propodeal spines subparallel (Fig. 13A); head in full face view with numerous hairs fringing lateral outline between eyes and mandibular bases (Cape York Pen., McIlwraith Range, QLD) ..... *P. darlingtoni* sp. nov.
- Pronotal dorsum more-or-less quadrate; propodeal spines divergent (Fig. 2E) head in full face view with no hairs fringing lateral outline between eyes and mandibular bases (Mt Abbott, QLD) ..... *P. burwelli* sp. nov.
7. Dorsum of gaster with golden or silvery pubescence and more-or-less distinct, dark reddish-brown, median patch, extending from dorsum of first gastral tergite towards apex (e.g. Fig. 2C, G) ..... 8
- Dorsum of gaster with widely diffused patch of golden pubescence extending towards apex; reddish-brown median patch on gaster not evident (e.g. Figs 1A-B, 4E-F) ..... 2
8. Median patch on gastral dorsum very dark and prominent (Figs 2G, 3A) ..... 9
- Median patch on gastral dorsum lighter and less prominent (e.g. Figs 2C, 4A) ... 10
9. Dorsum of pronotum with only a few, relatively short, erect hairs; hairs completely absent from mesonotum, propodeum, including declivity, and propodeal spines (Fig. 3A-B) (central QLD) ... *P. conciliata* sp. nov.
- Dorsum of mesosoma, including bases of propodeal spines, with numerous erect or semierect, long or medium length hairs (central QLD) ..... *P. callima* sp. nov.
10. Pronotal dorsum with margins weakly converging anteriorly (Fig. 4A) (Cooktown district, QLD) ..... *P. feehani* sp. nov.
- Pronotal dorsum more-or-less quadrate or weakly converging posteriorly (e.g. Fig. 2A, C) ..... 11
11. Smaller species (HL 2.18-2.37); clypeus virtually straight in profile; dorsa of head and mesosoma with rich golden pubescence, radiating towards midline of mesosoma (Fig. 2A-B) (Brisbane district, QLD) ..... *P. brisbanensis* sp. nov.
- Larger species (HL 2.28-2.62); clypeus sinuate in profile; dorsa of head and mesosoma with pubescence mostly silvery, diffused into pale golden along midline of mesosoma (Fig. 2C-D) (central QLD) ..... *P. brutella* sp. nov.
12. Petiolar spines subparallel, shorter than distance between their bases; dorsa of head and mesosoma with evenly distributed golden pubescence ..... 13.
- Petiolar spines divergent, about as long as or longer than distance between their bases; body pubescence unevenly distributed with head distinctly less pubescent than dorsum of mesosoma (Fig. 1A-B) (QLD, NSW, VIC) ..... *P. ammon* (Fabricius) (in part).
13. Smaller species (HL 2.02-2.24); propodeal spines widely divergent; petiolar spines strongly downturned (Fig. 4E-F) (QLD) ..... *P. uncaria* sp. nov. (in part).
- Larger species (HL 2.21-2.40); propodeal spines subparallel; petiolar spines more-

- or-less horizontal (Fig. 3E-F) (Hann Tblld, QLD) ..... *P. dougcooki* sp. nov.
14. Dorsum of mesosoma distinctly short and wide; propodeal spiracles situated on prominent, laterally projecting tubercles; petiolar dorsum strongly transverse, armed with very short spines ..... 15
- Dorsum of mesosoma more-or-less elongated; propodeal spiracles relatively flat, not situated on prominent tubercles; petiolar dorsum armed with spines of various lengths ..... 16
15. Head and mesosoma with distinct, closely appressed, golden pubescence; dorsum of gaster with only a few, medium length hairs and no pubescence (Fig. 14A-B) (Cape York Pen., QLD) ..... *P. diversa* sp. nov.
- Head and mesosoma without appressed pubescence; dorsum of gaster with very fine, closely appressed, pale golden pubescence (Fig. 14C-D) (QLD) ..... *P. tubifera* Forel
16. Head and mesosoma generally black, with only mouthparts, pronotal collar, spines and appendages occasionally reddish-brown ..... 24.
- Head and mesosoma not black, coloured or multi-coloured (e.g. Figs 11E-F, 12C-D) .. 17
17. Lateral margins of promesonotum strongly converging posteriorly (PMI > 190) (e.g. Fig. 12G) ..... 18
- Lateral margins of promesonotum less strongly converging posteriorly (PMI < 180) (e.g. Fig. 11C) or subparallel ..... 20
18. Generally smaller species (HL 1.31-1.56); antennal scapes virtually circular in cross-section; dorsum of gaster with distinct, thick silvery or golden, appressed pubescence (Fig. 12G-H) (New Guinea, WA, NT, QLD) ..... *P. schenkii* Forel.
- Generally larger species (HL 1.53-1.75); antennal scapes somewhat flattened, oval in cross-section; appressed pubescence on dorsum of gaster very sparse or lacking ..... 19
19. Antennal scapes relatively short (Sl 123); greatest width of pronotal dorsum near its mid-length; propodeal spines obliquely elevated from bases (Fig. 11G-H) (NT) ..... *P. isolata* sp. nov.
- Antennal scapes relatively long (Sl 134-143); greatest width of pronotal dorsum across humeri; propodeal spines horizontal (Fig. 11E-F) (Cape York Pen., QLD) ..... *P. injinooi* sp. nov.
20. Head, mesosoma and gaster metallic green, with front of head, anterior portion of pronotum and appendages orange or reddish-brown (Fig. 12C-D) (QLD) ..... *P. lydiae* Forel
- Head, mesosoma and gaster not metallic green, mostly medium to dark reddish-brown or red with gaster distinctly darker ..... 21
21. Head and mesosoma conspicuously red or orange-red; gaster very dark brown; appendages reddish-brown (Fig. 11A-B) (WA, NT, QLD) ..... *P. bohemia* sp. nov.
- Head and mesosoma almost uniformly medium to dark reddish-brown with gaster usually a shade lighter; appendages reddish-brown ..... 22
22. Pronotal humeri produced into dilated, dorsally shallowly concave, rounded prominences (Fig. 12A, E); head and mesosoma with more-or-less distinct, vermiculate sculpturation ..... 23.
- Pronotal humeri narrowly rounded; body sculpturation reticulate-punctate, not vermiculate (Fig. 11C) (Cape York Pen., QLD) ..... *P. capeyorkensis* sp. nov.
23. Head and mesosoma reticulate-punctate, shallowly vermiculate-rugose on vertex of head and dorsum of mesosoma; colour almost uniformly medium reddish-brown, appendages and spines a shade lighter (Fig. 12A-B) (QLD) ..... *P. lachesis* Forel
- Head and mesosoma with very distinct, vermiculate-rugose sculpturation; colour mostly black or very dark reddish-brown on most dorsal surfaces; appendages and spines distinctly lighter (Figs 12E-F) (Indonesia, New Guinea, Cape York, QLD) ..... *P. paxilla* Fr. Smith (in part).



24. Antennal scapes with at least a few short, bristle-like hairs along leading edge ... 25
  - Antennal scapes without any hairs along leading edge.....35
25. Promesonotal lateral margins only very weakly converging posteriorly (PMI < 140); petiole in lateral view rather low with very short, curved spines (Fig. 13C-D) (NT) .....*P. nourlangie* sp. nov.
  - Promesonotal lateral margins more strongly converging posteriorly (PMI > 150); petiole in lateral view distinctly higher with longer spines of various configurations .....26
26. Outline of head in full face view with numerous, bristle-like hairs fringing margin between eyes and mandibular bases .....28
  - Outline of head in full face view without hairs, or at most with only a few, inconspicuous, very short hairs fringing margin between eyes and mandibular bases .....27
27. Head, mesosoma and petiole very distinctly and evenly, rather coarsely, reticulate-punctate; petiole in profile with posterior face distinctly convex and swollen towards base (Fig. 19G-H) (Nth QLD).....*P. tenebra* sp. nov.
  - Head, mesosoma and petiole finely reticulate-punctate with sculpture somewhat longitudinally rugulate-striate on vertex of head; petiole in profile with posterior face only weakly convex (Fig. 9A-B) (New Ireland, New Guinea, Cape York Pen.).....*P. semiobscura* Donisthorpe.
28. Petiolar spines distinctly downcurved, hook-like (Fig. 1D) (only WA) ..... *P. ammonoëides* Roger.
  - Petiolar spines more-or-less horizontal or obliquely elevated, never hook-like (e.g. Figs 9D, 10B).....29
29. Promesonotal lateral margins distinctly converging posteriorly (PMI > 190) (e.g. Figs 9C, 10A) ..... 30
  - Promesonotal lateral margins less strongly converging posteriorly (PMI < 180) (e.g. Fig. 12E) .....31
30. Antennal scapes relatively short (SI < 141); petiole in profile with posterior face only weakly convex towards base (Fig. 9C-D) (Nth QLD) ..... *P. stricta* sp. nov.
  - Antennal scapes relatively long (SI > 154); petiole in profile distinctly swollen towards base (Fig. 10A-B) (NT)..... *P. weiri* sp. nov.
31. Pronotal dorsum with humeri produced into dilated, distinctly rounded prominences (Fig. 12E-F); head and mesosoma with distinct, vermiculate sculpturation (Indonesia, New Guinea, Cape York) ..... *P. paxilla* Fr. Smith (in part).
  - Pronotal dorsum with humeri rounded or subangular, not distinctly dilated; head and mesosoma reticulate-punctate.....32
32. Petiolar node in profile with posterior face distinctly swollen towards base (Fig. 10B); clypeus in profile virtually straight or only very shallowly impressed anteriorly ... 33
  - Petiolar node in profile with posterior face not distinctly swollen, descending towards base in weakly convex line; clypeus in profile distinctly sinuate (Fig. 8E-F) (Nth QLD) .....*P. placida* sp. nov.
33. Dorsum of gaster with distinct, closely appressed, golden pubescence, completely hiding underlying sculpturation (Fig. 8C-D) (Pilbara, WA) ..... *P. pilbara* sp. nov.
  - Dorsum of gaster with much diluted, silvery or golden, appressed pubescence (Fig. 11A-B).....34
34. Dorsum of mesosoma with very short, erect, bristle-like hairs (Fig. 8G-H) (Barrow I., WA) .....*P. seducta* sp. nov.
  - Dorsum of mesosoma with distinctly longer, posteriorly directed hairs that are up to half greatest diameter of eyes in length (Fig. 9E-F) (Tanami Desert, NT) ..... *P. tanami* sp. nov.
35. Promesonotal lateral margins strongly converging posteriorly (PMI > 185) (e.g. Figs 1G, 13G)..... 36
  - Promesonotal lateral margins less strongly or weakly converging posteriorly (PMI < 180) (e.g. Fig. 3C, 13E).....37

36. Dorsum of petiole with flat, strongly posteriorly sloping, triangular platform; petiolar spines obliquely elevated; propodeal spines subparallel or only weakly divergent; antennal scapes relatively short (SI < 142) (Fig. 13G-H) (NT, QLD) ..... *P. trapezoidea* Mayr.
- Dorsum of petiole narrowly rounded, without flat platform; petiolar spines horizontal; propodeal spines widely divergent; antennal scapes longer (SI > 160) (Fig. 1G-H) (Paluma, Mt Elliot).....*P. aurora* sp. nov.
37. Propodeal spines strongly divergent and long, distinctly longer than distance between their bases (Fig. 3C).....38.
- Propodeal spines less strongly divergent or subparallel, distinctly shorter than distance between their bases (Fig. 13E) ..... 39.
38. Dorsum of body without hairs, except a few, short hairs on apical gastral tergites; closely appressed pubescence very diluted with whole body superficially glabrous (Fig. 3C-D) (NT, Nth QLD) ..... *P. cracentia* sp. nov.
- Dorsum of mesosoma with rather sporadic hairs of various lengths; gaster with hairs more abundant, notably on venter; appressed, golden pubescence diluted on most body surfaces, except rather dense on gastral dorsum (Fig. 6G-H) (WA, NT, Nth QLD) ..... *P. crawleyi* Forel.
39. Dorsum of petiole with flat, transversely wide platform; dorsum of body with very abundant, long silvery hairs that are distinctly longer than greatest diameter of eyes; antennal scapes very short (Fig. 13E-F) (SI < 125) (Cape York Pen., Nth QLD) ..... *P. thusnelda* Forel.
- Dorsum of petiole narrowly rounded without flat platform; body with relatively short, erect hairs or, at most, with only sporadic, variously curved, longer hairs (as in *P. hoeffmanni* and *P. denticulata*); antennal scapes longer (SI > 125) ..... 40
40. Dorsum of head and mesosoma with distinct, rather abundant, mostly golden, medially radiating pubescence 41.
- Dorsum of head and mesosoma with rather diluted, mostly silvery, variously scattered pubescence ..... 45
41. Petiolar node in side view with anterior and posterior faces subparallel towards base; antennal scapes rather short (Fig. 7C-D) (SI < 137) (Nth QLD) ... *P. electra* sp. nov.
- Petiolar node in side view with anterior and posterior faces converging dorsally; posterior face descending towards base in oblique, almost straight line ..... 42
42. Dorsum of mesosoma distinctly slender (PMI > 167); propodeal spines obliquely elevated from bases; petiolar spines widely divergent, very slender and long, about as long as distance between their bases (Fig. 1E-F) (QLD, NSW).....*P. angusta* Forel.
- Dorsum of mesosoma not distinctly slender (PMI < 167); propodeal spines more-or-less horizontal or weakly downturned; petiolar spines subparallel or only weakly divergent, distinctly shorter than distance between their bases ..... 43
43. Petiolar spines divergent, obliquely elevated from bases; propodeal spines virtually parallel along entire length (Fig. 3G-H) (Nth QLD) *P. elegantula* sp. nov.
- Petiolar spines only weakly divergent or subparallel, horizontal or downturned; propodeal spines weakly divergent with tips curved outwards ..... 44
44. Petiolar spines horizontal; dorsum of gaster with wide median patch of golden pubescence, laterally diffused into pale golden and silvery on sides and venter (Fig. 1A-B). *P. ammon* (Fabricius) (in part).
- Petiolar spines strongly downturned from bases; whole dorsum of gaster with distinct, reddish-golden pubescence, lined with silvery pubescence on sides and venter (Fig. 4E-F)..... *P. uncaria* sp. nov. (in part)
45. Dorsum of mesosoma with rather long, variously curved, scattered hairs; hairs more abundant and posteriorly directed on gaster..... 46
- Dorsum of mesosoma virtually lacking hairs or with only very short, much diluted hairs on dorsal body surfaces, including



- gaster.....47
46. Promesonotal lateral margins strongly converging posteriorly (PMI > 170); body with variously curved, scattered hairs that are longer than half of greatest diameter of eyes; posterior face of petiolar node convex, but not distinctly swollen (Fig. 7A-B) (Indonesia, New Guinea, Bismarck Archipelago, Torres Strait) ..... *P. denticulata* Karavaiev.
- Promesonotal lateral margins rather weakly converging posteriorly (PMI < 145); body with variously curved hairs, most longer than greatest diameter of eyes; posterior face of petiolar node distinctly swollen towards base (Fig. 7E-F) (Nth western QLD) ..... *P. hoffmanni* sp. nov.
47. Dorsum of petiole transversely narrow, rather deeply concave between closely approximated bases of spines ..... 48
- Dorsum of petiole flat or very weakly concave; bases of spines separated by transversely wide dorsum of segment ..... 50
48. Petiolar spines widely divergent, highly obliquely elevated; propodeal spines very slender, divergent; posterior face of petiolar node convex but not distinctly swollen (Fig. 6E-F) (Geraldton, WA) ..... *P. clarki* sp. nov.
- Petiolar spines parallel or only weakly divergent, moderately elevated; propodeal spines subparallel; posterior face of petiolar node distinctly swollen towards base . 49.
49. Smaller species (HL < 1.62); anterior clypeal margin truncate medially; bases of petiolar spines very closely approximated, spines subparallel; body sculpture very finely reticulate-punctate, semi-polished (Fig. 6A-B) (WA, NT) ..... *P. anderseni* sp. nov.
- Larger species (HL > 1.62); anterior clypeal margin with denticulate median flange; bases of petiolar spines more widely separated, spines weakly; body sculpture closely reticulate-punctate, distinctly opaque (Fig. 6C-D) (NT, Gulf Country, QLD) ..... *P. archeri* sp. nov.
50. Petiole with posterior face distinctly swollen towards base; petiolar spines elevated from bases; head and mesosoma with rather sporadic, very short, bristle-like hairs, no hairs on dorsum of petiole; body sculpture closely reticulate-punctate, distinctly opaque (Fig. 7G-H) (WA, NT, QLD) ..... *P. melanura* sp. nov.
- Petiole with posterior face only moderately convex towards base; petiolar spines horizontal; head, mesosoma and petiole with more abundant, marginally longer hairs; body sculpture finely reticulate-punctate, semi-polished (Fig. 8A-B) (Nth and Central QLD) ..... *P. penelope* Forel.

### *POLYRHACHIS* (*HAGIOMYRMA*) AMMON SPECIES-GROUP

#### *Polyrhachis* (*Hagiomyrma*) *ammon* (Fabricius, 1775) (Fig. 1A-B)

*Formica ammon* Fabricius, 1775: 394. Holotype worker. Type locality: AUSTRALIA (as 'Nova Hollandia') (J. Banks), BMNH (examined).

*Polyrhachis ammon* (Fabricius). Fr. Smith, 1858: 73 (combination in *Polyrhachis*); Mayr, 1876: 72 (descriptions of queen and male).

*Myrma* (*Hagiomyrma*) *ammon* (Fabricius). Wheeler, 1911: 860 (combination in *Myrma* (*Hagiomyrma*)); Forel, 1915: 108.

*Polyrhachis ammon* var. *angustata* Forel, 1902: 525. Kohout, 1988: 430 (junior synonym of *P. ammon*).

**Material.** Australia (no further data) (w). QLD: Bakers Blue Mtn, 17 km W of Mt Molloy, 12.ix.1981 (GBM & DJC) (w); Kanervo Rd., W of Kuranda, 16°53'S, 145°32'E, 400 m, iii.1996 (C. Reid) (w); 16 km E of Mareeba, 400 m, 29.i.1964 (J. Sedláček) (w); Millstream Falls NP, 17°39'S, 145°26'E, xii.1985 (H.T. Imai HI85-299) (w, ♀); Kirrama Ra., c. 600 m, 18°10'S, 145°44'S, 26.ix.1987 (RJK acc. 87.97) (w); Hervey Ra., Turtle Rock area, 19°24'S, 146°31'E, c. 500 m, 3.vi.1996 (RJK & SKR acc. 96.11) (w); Proserpine, N of Airport Drive, 20°29'15"S, 148°33'45"E, 7.xi.2007 (also 10-16.ii.2007, 13.ii-12.iii.2008, 15.viii-5.ix.2007, 2-10.v.2007) (CJB, C. Lambkin, N. Starick, R. Raven, J. Stanisic) (w); Cape Hillsborough NP, 20°55'S, 149°02'E, 2.i.1979 (RJK acc. 79.11) (w); Mt Blackwood NP, 21°02'S, 148°56'E, 14.iv.1981 (RJK acc. 81.102) (w); Eungella NP, Finch Hatton Gorge, 21°04'S, 148°38'E, 7-13.iv.1975 (RJK acc. 75.171) (w); ditto, Broken R., 21°10'S, 148°30'E, 29.ix.1976 (RJK acc. 76.101) (w); Britton Ra., 6 km NNE of Homevale, 21°23'S, 148°33'E, 1-6.iv.1975 (RJK acc. 75.159) (w); Lords Table Plateau, 22°39'23"S, 140°0'51"E, 10.i.2006 (also 7-8.iii.2006 (CJB, GBM, QM Party) (w); Lorna Vale Hmsd, nr Marlborough, 22°43'S, 149°46'E, 8.iv.1981 (RJK acc. 81.44) (w); 7.5 km E of Clermont, 22°49'21"S,

- 147°42'46"E, 13-14.i.2006 (CJB) (w); Scotts Peak, SE base, 22°51'35"S, 148°13'41"E, 9.iii.2006 (S. Wright, CJB) (w); Palm Park, 5.6 km ESE of Byfield, 24.v.1969 (T.G. Campbell & R. Jealous) (w); 6 km N of Mt Archer, nr Rockhampton, 23°17'S, 150°34'E, 4.i.1979 (RJK acc. 79.17) (w); Expedition Ra., Blackdown Tblld, 23°45'S, 149°07'E, 4-6.iv.1981 (RJK accs 81.6, 34) (w); ditto, 1-6.ii.1981 (GBM) (w); Rundle Ra., 36 km NW of Gladstone, 23°39'S, 150°58'E, 24-30.iii.1975 (RJK accs 75.116, 120, 122) (w); Mt Moffat NP, Marlong Arch, 23.ix.1986 (GBM, GIT & DKY) (w); ditto, Top shelter shed, 1000 m, 10-12.xii.1987 (GBM, GIT & DKY) (w); ditto, The Chimneys, 14.xii.1987 (GBM, GT & DKY) (w); Kroombit Tops, 29.ix.1985 (GBM) (w); Moolayember Ck NP, 25°14'28"S, 148°37'20"E, 3-10.iii.2006 (CJB, S. Wright) (w); Fraser I., Urang Ck, 25°19'S, 153°03'E, 14.xii.1984 (RJK acc. 84.446) (w); ditto, Lake McKenzie, 25°27'S, 153°03'E, 12.xii.1984 (RJK acc. 84.445) (w); Taroom Distr., Boggomoss, 25°29'0"S, 150°8'0"E, 14.xi.1996 (QM Survey) (w); Taroom Distr., 9 km N of Ooline Scrub, 25°35'0"S, 149°46'0"E, 15.vi.1996 (H. Janetzki) (w); Cooloola SF, Rainbow Bch, 25°57'S, 153°05'E, 18-25.i.1975 (RJK acc. 75.48) (w); ditto, Seary Scrub, 25°57'S, 153°06'E, 31.viii.1974 (RJK acc. 74.48) (w); ditto, Camp Milo Rd, i.1985 (C. Wallace) (w); Peregrine Bch, 6 km N of Coolool, 26°29'S, 153°05'E, 12.iv.1974 (RJK acc. 74.23) (w); Landsborough, 10.xi.1981 (MJH); Beerwah, 4.xi.1980 (MJH) (w); Bunya Mts NP, 26°51'S, 151°34'E, 1-6.iii.1976 (P. Filewood) (w); Dunmore, W of Toowoomba, 22-23.xii.1981 (MJH & M. de Baar) (w); Stanley R., Environ. Edu. Centre, 27°0'45"S, 152°33'9"E, 31.viii.2006 (B. Renton, S. Clarke, CJB) (w); Bribie I. Rd, 9 km E of Caboolture, 27°05'S, 153°02'E, 19.x.1974 (RJK acc. 74.118) (w); Bribie I., 27°05'S, 153°02'E, 6.vii.1974 (RJK acc. 73.37) (w); Kogan Ck, Braemar Forest Stn, 27°11'S, 150°47'E, 5-6.ii.1980 (RJK acc. 80.2) (w); D'Aguilar Ra., Lacey's Ck Rd, 27°14'S, 152°43'E, 15-20.xii.1974 (RJK acc. 74.157) (w); Moreton I., 27°17'S, 153°25'E, 23.vii.1980 (V. Salanitri) (w); Crows Nest NP, Perseverance sect., 27°18'53"S, 152°6'51"E, 4.xii.2003 (CJB, S. Wright, O. Seeman) (w); Boondall Wetlands, 27°20'21"S, 153°4'27"E, 11.xi.2003 (also 20.ii.2004) (S. Wright, QM Party) (w); Perseverance Ck For. Res., 27°20'57"S, 152°6'18"E, 4.xii.2003 (CJB, S. Wright, O. Seeman) (w, ♀); Brisbane Airport, 27°22'16"S, 153°6'46"E, 6.x.2003 (CJB, E. Vanderduys) (w); Mt Nebo Rd, 27°26'S, 152°54'E, 21.ix.1974 (RJK acc. 74.106) (w); Mt Coot-tha Park, Brisbane, 27°29'S, 152°57'E, 12.iii.1974 (RJK acc. 74.12) (w); ditto, 16.viii.2003 (CJB) (w); Ransome Reserve, 27°29'34"S, 153°11'5"E, 10.xi.2003 (also 27.v-30.vi.2003, 24.ii.2004) (S. Wright, E. Volschenk, QM Party) (w); Belmont Hills Bushlands, 27°30'47"S, 153°7'5"E, 22.iv.2003 (CJB, S. Wright, E. Volschemk) (w); Brisbane, Kingston, 29.ix.1981 (MJH) (w); Bulimba Ck, Carindale, 27°30'9"S, 153°6'34"E, 3.xi.2003 (also 1.ix-10.x.2003, 30.x.-1.xii.2003, 19.ii.2004) (QM Party) (w); North Stradbroke I. (27/153), x.1982 (JDM) (w); ditto, 27°37'S, 153°27'E, 10.i.2002 (CJB) (w); 3.5 km SSE of Dunwich, 27°31'41"S, 153°25'1"E, 7-8.i.2002 (D. Cook) (w); Redlands, Hilliards Ck, 27°32'52"S, 153°14'28"E, 20.i.2009 (QM Party) (w); Enterprise Mine, Blackbutt, 27°33'23"S, 153°27'34"E, 9.i.2002 (CJB, QM Party) (w); ditto, Mallee, 27°34'27"S, 153°26'20"E, 7-11.i.2002 (CJB, QM Party) (w); ditto, Scribbly Gum, 27°36'44"S, 153°26'27"E, 10.i.2002 (CJB, QM Party) (w); Gold Ck Reservoir, 27°27'53"S, 153°52'32"E, 29.iv.2003 (also 26.v.2003, 4.xi.2003, 23.ii.2004) (CJB, GBM, E. Volschenk, QM Party) (w); Chelsea Rd Bushlands Res., 27°28'58"S, 153°11'15"E, 23.iv.2003 (also 10.xi.2003, 24.ii.2004) (E. Volschenk, S. Wright, CJB, QM Party) (w); Buhot Ck, Burbank, 27°35'27"S, 153°10'19"E, 6.xi.2003 (also 18.ii.2004) (QM Party) (w); Doolandella, Paradise Rd, 27°36'9"S, 153°1'22"E, 1-15.ii.2002 (CJB, S. Wright) (w); Karawatha For., 27°37'24"S, 153°4'38"E, 25-26.i.2004 (also 17.iv.2003, 25-26.v.2003, 5.xi.2003) (CJB, GBM, S. Wright, QM Party) (w); Illaweena St, Drewvale, 27°38'39"S, 153°3'47"E, 17.iv.2003 (CJB, S. Wright) (w); Spring Mtn, 27°43'17"S, 152°52'42"E, 19.iii.2005 (GBM, QM Party) (w); Mt French, lookout, 27°59'9"S, 152°37'11"E, 13.viii.2003 (CJB) (w); Upper Tallebudgera Ck, 10-11.iii.1989 (GBM) (w); Lake Moogerah, 15 km SW of Boonah, 28°04'S, 152°32'E, 1.i.1975 (RJK acc. 75.2) (w); Stanthorpe, 13.xi.1985 (DKY) (w); Girraween NP, 28°50'S, 151°55'S, 9-10.i.1982 (RJK acc. 82.2) (w); Nundubbermere Falls, 25 km SW of Stanthorpe, 1-4.iv.1988 (GBM) (w); Texas Caves, nr Russenden Hmsd, 28°56'S, 151°27'E, 24-28.ii.1975 (RJK acc. 75.98) (w); Mt Barney, 5.x.1962 (E. Exley) (w). NSW (including ACT): Avoca Beach, 28.x.1985 (L. Hunter) (w); Manning Pt, 20 km E Taree, 7.i.1991, rf. (G. & T. Williams) (w); 4 km NE Harrington, 6.iii.1992, rf. (G. Williams) (w); Myvall Lakes, 32°30'S, 152°21'E, 15.xi. & 14.xii.1996 (L. Wilkie) (w); Wyrabalong NP, 33°16'S, 151°32'E, 15.xii.1996 (L. Wilkie) (w); Richmond Ra. SE, Wattle Ck Rd., 28°38'S, 152°46'E, 130m, (M. Gray & G. Cassis) (w); Doubleduke SF, 29°12'S, 153°15'E, 4.ii-9.iv.1993 (M. Gray & G. Cassis) (w); Bodella SF, Reservoir Link Rd., 9.iii.1999 (L. Wilkie et al) (w); Athol (W.M. Mann) (w); nr Taree, 25.ix.1981 (M. de Baar) (w); 32 km N of Newcastle, 9.xii.1960 (E.B. Webb) (w); Olney SF, 33°06'S, 151°25'E, 23.ii.1991 (T. Gush) (w); McPherson SF, 33°13'S, 151°11'E, 7.x.1990 (T. Gush) (w); Mooney Mooney, 33°32'S, 151°12'E, 25.xii.1990 (T. Gush) (w); Maroota SF, 33°33'S, 150°58'E, 10.vi.1990 (T. Gush) (w); Gosford, x.1914 (W.M. Wheeler) (w); Woy Woy, 14.vi.1959 (BBL) (w); Castlereagh SF, 33°40'S, 150°45'E, 6.vii.1991 (T. Gush) (w); Galston Gorge, 25 km NNW of Sydney, 33°40'S, 151°05'E, 22.i.1982 (RJK acc. 82.44) (w); Sydney (W.M. Mann) (w); Royal NP, Garie Bch, 34°09'S, 151°04'E, 22.i.2004 (C. Reid) (w); Canberra, Black Mtn, 35°16'S, 149°06'E, 1973 (RJK acc. 73.106) (w); Jerrabomberra Hill, nr Queanbeyan, 35°22'S, 149°13'E, 2.xi.1985 (H.T. Imai H185-204) (w); Kioloa, ANU Field Stn, 35°32'S, 150°23'E, 50 m, 12.viii.1990 (S. Shattuck #1687) (w); 5 km W of Nellingen, 35°39'S, 150°08'E, 7.xi.1985 (H.T. Imai H185-218, 238, 240) (w, ♀); Mt Gladstone NP, nr Cooma, 36°15'S, 149°04'E, c. 1110 m, 11.ii.1974 (RJK acc. 74.12) (w); Rosedale, SE of Batemans Bay, 7.xii.1975 (BBL) (w); Bungonia Lookout, 17.v.1978



# Revision of *Polyrhachis* (*Hagiomyrma*)



## *POLYRHACHIS* (*HAGIOMYRMA*) AMMON SPECIES GROUP

Map 1	● <i>P. ammon</i>	▼ <i>P. ammonocoides</i>
Map 2	● <i>P. angusta</i>	▼ <i>P. aurora</i>
Map 3	● <i>P. brisbanensis</i>	▼ <i>P. brutella</i>
Map 4	● <i>P. burwelli</i>	▼ <i>P. callima</i>
Map 5	● <i>P. conciliata</i>	▼ <i>P. cracentia</i>
Map 6	● <i>P. dougcooki</i>	▼ <i>P. feehani</i>
Map 7	● <i>P. elegantula</i>	▼ <i>P. semiaurata</i>
Map 8	● <i>P. uncaria</i>	▼ <i>P. veroni</i>

(BBL) (w); Booti Booti NP, 32°14'S, 152°32'E, 12.xii.1996 & 31.v.1997 (L. Wilkie) (w); Munmorah State Rec., 33°13'S, 151°34'E, 23.v.1998 (L. Wilkie) (w); Second gully N of Wonga Gully, 30°48'S, 152°07'E, 4.ii-9.iv.1993 (M. Gray & G. Cassis) (w); Crown Res., 31°18'S, 151°9'E, 24.xi-15.xii.2002 (L. Wilkie et al.) (w); Attunga SF, 30°56'S, 150°54'E, 15.xi-6.xii.2001 (G. Carter) (w); Oaky Ck NR, NE side of Figtree Mt, 31°6'S, 150°36'E, 17.xi-8.xii.2001 (L. Wilkie & D. Smith) (w); W of Flagstaff Mtn, nr Tamworth, 31°5'S, 150°58'E, 15.xi-6.xii.2001 (H. Doherty & M. Elliott) (w); Tamworth, Moore Ck area, 14.v.1987 (BBL) (w); Linton NR, 30°26'S, 150°51'E, 18.xi-9.xii.2001 (H. Doherty & M. Elliott) (w); Mt Kaputar NP, base at N side of Mt Yulludunida, 30°16'S, 150°4'E, 20.xi-11.xii.2001 (H. Doherty & M. Elliott) (w); Kaputar, Narrabri, Gravel Pit Ck (PMR) (w). VIC: Mt Ida, nr Heathcote, 29.v.1961 (BBL) (w); You Yangs, nr Geelong, 1.ii.1958 (BBL) (w).

**Description.** *Worker.* Dimensions. (holotype cited first): TL c. 9.07, 7.91-9.83; HL 2.22, 1.96-2.31; HW 1.78, 1.56-1.91; CI 80, 78-85; SL 2.67, 2.42-2.97; SI 150, 141-159; PW 1.51, 1.39-1.72; MW 0.94-1.09; PMI 135-159; MTL 3.17, 2.81-3.43 (37 measured).

Median flange of anterior clypeal margin with distinct, acute teeth medially, laterally flanked by acute angles. Clypeus with median, posteriorly raised, longitudinal carina; sinuate in profile. Frontal carinae with only moderately raised margins; central area relatively wide with flat frontal furrow. Sides of head in front of eyes converging anteriorly in virtually straight line, behind eyes sides rounding into moderately convex occipital margin. Eyes situated close to occipital corners, convex, marginally breaking lateral cephalic outline in full face view. Ocelli lacking. Pronotal dorsum wider than long, humeri distinctly rounded, weakly dilated and shallowly concave dorsally; lateral margins behind humeri usually shallowly emarginate or notched, weakly converging towards promesonotal suture. Mesonotum with lateral margins converging posteriorly into dorsally indistinct metanotal groove. Propodeum with lateral margins divergent, terminating in broad-based, horizontal, subparallel or weakly divergent acute spines, tips weakly turned outwards; declivity steep, convex in profile. Petiole armed with a pair of horizontal, divergent, acute spines.

Mandibles finely longitudinally striate with numerous piliferous pits towards bases. Head

and mesosoma finely reticulate-punctate, sculpturation on vertex and sides of head more distinct and organised into more-or-less longitudinal striae. Gaster finely shagreened.

Mandibles with medium length, curved, golden hairs at masticatory and outer borders; numerous closely appressed, shorter hairs towards mandibular bases. Only a few anteriorly directed setae fringing anterior clypeal margin. Several short to medium length, erect hairs on clypeus, along frontal carinae and vertex, no hairs breaking lateral outline of head in full face view. Numerous, medium length, erect golden hairs on most body surfaces, including upper part of propodeal declivity; hairs somewhat longer and posteriorly inclined on gaster, notably around apex and on venter. Closely appressed, mostly silvery or pale golden pubescence rather sparse on head, more abundant on sides of mesosoma, propodeal dorsum, petiole and venter of gaster. Rather abundant, mostly rich golden, with distinct brassy hue, somewhat medially radiating pubescence along promesonotal midline and on gastral dorsum where it virtually hides underlying sculpturation.

Black with only mandibular teeth and condylae reddish-brown.

*Queen.* Dimensions. TL c. 9.78-11.14; HL 2.12-2.37; HW 1.75-1.96; CI 81-86; SL 2.37-2.77; SI 133-148; PW 2.02-2.37; MTL 2.87-3.22 (17 measured).

Queen similar to worker with usual characters identifying full sexuality. Pronotal dorsum with humeri widely rounded, shallowly concave dorsally along narrowly raised margins. Mesoscutum almost as long as wide; anterior margin evenly rounded; median line distinct, parapsides rather flat; mesoscutum and mesoscutellum uniformly flat in lateral view. Propodeal and petiolar spines similar to those in worker, but distinctly shorter. Sculpturation, pilosity, pubescence and colour virtually identical to worker.

Males and immature stages present in the QM and ANIC collections.

**Remarks.** *Polyrhachis ammon* closely resembles *P. uncaria* described below, however, they



differ in numerous characters, discussed in the remarks section under *P. uncaria*. *Polyrhachis ammon* is a widespread and relatively common, ground-nesting species, mostly occurring in open eucalypt forests along the eastern Australian seaboard. It ranges from northern Queensland south to Victoria and as far inland as the Australian Capital Territory, however, it becomes rather uncommon towards the northern limit of its distribution. Throughout its range *P. ammon* forms numerous, more-or-less overlapping populations that often, to some extent, differ morphologically from the holotype. However, when specimens from across the entire distribution were compared, no taxonomically significant variability was evident and I believe that all the examined populations are conspecific.

***Polyrhachis* (*Hagiomyrma*) *ammonoides*  
Roger, 1863  
(Fig. 1C-D)**

*Polyrhachis ammonoides* Roger, 1863: 157. Lectotype and paralectotype workers (1+2) (designated by Kohout, 1994). Type locality: AUSTRALIA (as 'Neu-Holland, Port Jackson') (locality evidently in error – see Kohout, 1994: 135), MNHN, NHMW (examined).

*Polyrhachis ammon* r. *ammonoides* Roger. Forel, 1879: 116 (reduced in rank to race of *ammon*).

*Polyrhachis ammonoides* Roger. Dalla Torre, 1893: 258 (revived status as species).

*Polyrhachis* (*Hagiomyrma*) *ammonoides* Roger. Forel, 1915: 108 (combination in *P. (Hagiomyrma)*).

*Polyrhachis chalcas* Forel, 1907: 307. Kohout, 1994: 135 (junior synonym of *ammonoides*).

**Material.** WA: Montebello Is, Northwest I., 20°22'S, 115°32'E, 22.x.2000 (D. Edinger) (w); Barrow I., 20°46'S, 115°24'E, ii.1977 (H. Heatwole) (w); Dampier, 11.vi.1975 (JDM) (w); Yardie Ck, 29.vii.1975 (R.P. McMillan) (w); 20 km S of Minderoo, 17.x.1970 (JEF) (w); Blowholes, N of Carnarvon, ii-viii.1983 (BBL) (w); Kalbarri, Shellhouse Head, vi.1991 (I. & G. Grose) (w); Kalbari NP, 1.viii.1983, coastal scrub (BBL) (w, ♂); Kalbari, 1.x.1998 (ANA) (w); Cervantes, 4.x.1998 (ANA) (w); Easter Group Is, Abrolhos I., 1.ix.1972 (Aquinas College) (w, ♀); Geraldton (J. Clark) (w); ditto, 18-19.xi.1963 (J. Sedláček) (w); 3.2 km SSW of Dongara, 15.x.1970 (JEF) (w); Exmouth, 22.ix.1985 (R.P. McMillan) (w); Enderby I., 20°36'S, 116°29'E, 31.vii-1.viii.1985 (R.P. McMillan) (w); Shark Bay, 20.vii.1985 (R.P. McMillan) (w); Rosemary I., 20°29'S, 116°35'E, 6.viii.1985 (R.P. McMillan) (w); Dirk Hartog I., Turtle Bay, 3.ix.2006 (G. Wright) (w); ditto, S of Sandy Pt., 16.ix.2006 (G. Wright) (w, ♀); ditto, Surf Pt., 21.ix.2006 (G. Wright) (w); Useless Loop, 26°08'S, 113°25'E, 1.viii.1998 (R.P. McMillan) (w); ditto, 11.xi.1998 (R.P. McMillan) (w, ♀); Coolimba Bay,

29°51'S, 114°59'E, xii.1989 (R.P. McMillan) (w); John Forrest NP (E of Perth), 1973 (G.H. Lowe) (w); Beekeeper Res., Leeman, 16.vii.2001 (R.P. McMillan) (w).

**Description.** *Worker*: Dimensions of *P. ammonoides* (lectotype cited first): TL c. 8.0, 6.65-8.52; HL 1.98, 1.65-2.09; HW 1.53, 1.34-1.65; CI 77, 77-82; SL 2.28, 2.09-2.56; SI 149, 146-164; PW 1.34, 1.05-1.50; MW 0.81-0.88; PMI 147-164; MTL 2.65, 2.46-3.12 (25 measured).

Median flange of anterior clypeal margin irregularly jagged with one central tooth and rather blunt lateral angles. Clypeus with median, longitudinal carina, sinuate in profile. Frontal carinae with distinctly raised margins; central area relatively wide, weakly raised medially. Sides of head in front of eyes converging anteriorly in virtually straight line; behind eyes, sides widely rounding into convex occipital margin. Eyes convex, marginally breaking lateral cephalic outline in full face view. Ocelli lacking, only rudimentary lateral ocelli indicated in some specimens. Pronotal dorsum wider than long; humeri narrowly rounded with shallow depression dorsally; lateral margins behind humeri sinuate, distinctly raised and only weakly converging towards promesonotal suture. Lateral margins of mesonotum converging posteriorly in gentle curve towards metanotal groove indicated by weakly impressed, posteriorly bowed line. Propodeum with lateral margins terminating in distinctly divergent, slender, acute spines. Petiole armed with pair of divergent, hook-shaped, acute spines.

Mandibles finely longitudinally striate with numerous piliferous pits towards bases. Head and mesosoma reticulate-punctate; sculpturation on vertex somewhat coarser with numerous shallow pits. Gaster finely shagreened.

Mandibles with medium length, curved, golden hairs at masticatory and outer borders; numerous closely appressed, shorter hairs towards mandibular bases. Several anteriorly directed, longer setae arising from median anterior clypeal margin, shorter setae fringing margin laterally. Long and medium length, golden, mostly erect hairs, some longer than greatest diameter of eyes, on clypeus, along frontal carinae and on vertex, numerous hairs

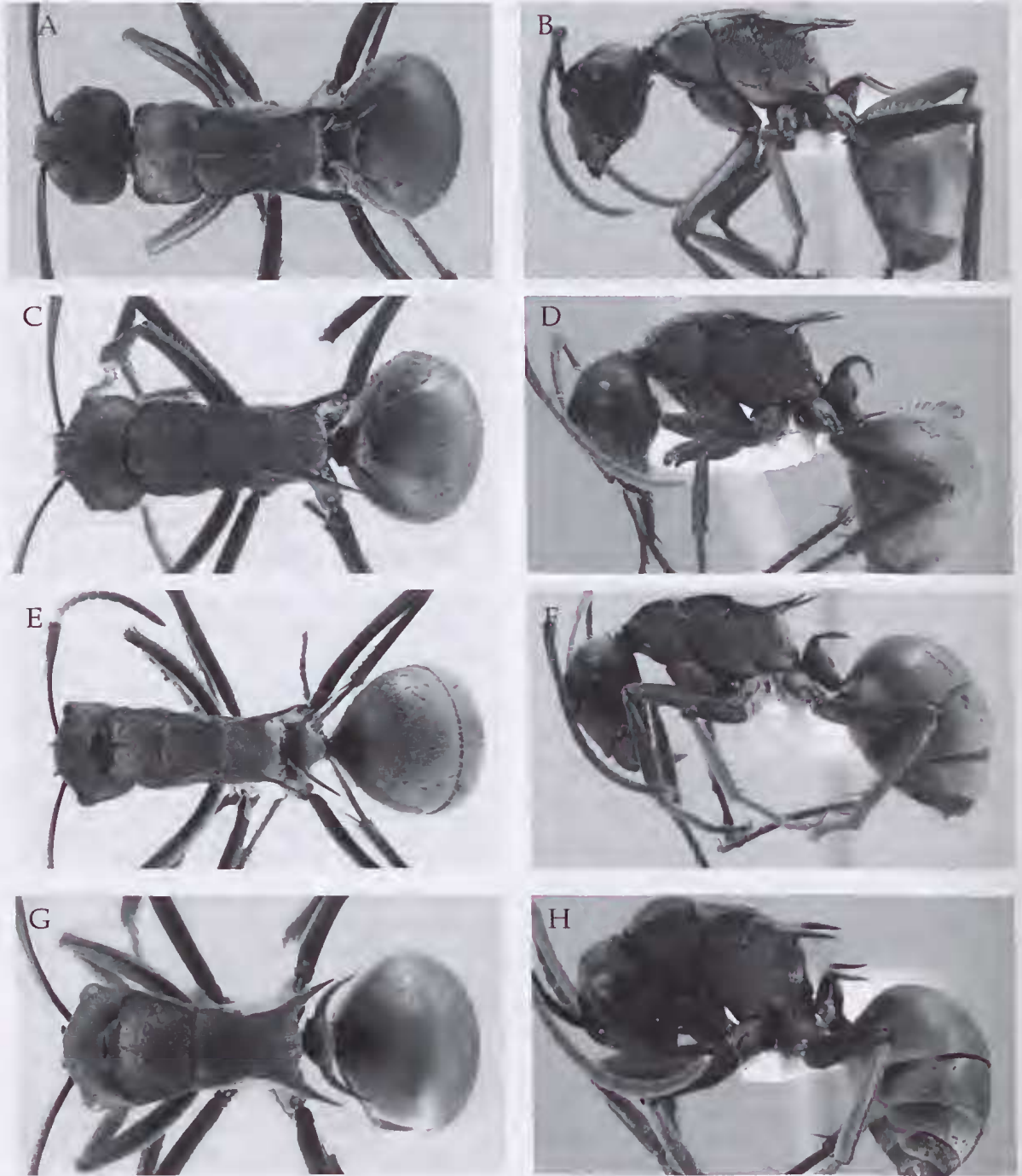


FIG. 1. *Polyrhachis* (*Hagiomyrma*) *ammon* species-group – dorsal (left) and lateral (right) view. A–B, *P. ammon* (Fabricius); C–D, *P. ammonoeides* Roger; ; E–F, *P. angusta* Forel; G–H, *P. aurora* sp. nov. (not to scale).



fringing lateral outline of head in full face view. Short, erect hairs along leading edge of antennal scapes. Rather long, golden hairs abundant on most body surfaces, including propodeal declivity and spines, except apices. Hairs somewhat longer and posteriorly inclined on gaster, notably around apex and on venter. Closely appressed, rather sparse, mostly silvery pubescence on head, mesosoma, petiole and venter of gaster; longer, rich golden pubescence on gastral dorsum, completely hiding underlying sculpturation.

Black with only mandibular teeth, apical funicular segments and legs dark to very dark reddish-brown.

**Queen.** Dimensions: TL c. 9.68-10.43; HL 2.18-2.21; HW 1.68-1.75; CI 76-79; SL 2.37-2.56; SI 139-149; PW 1.96-2.12; MTL 2.93-2.99 (4 measured).

Apart from sexual characters, closely resembling worker except: pronotal dorsum with humeri rounded and indication of blunt humeral angles. Mesoscutum in dorsal view virtually as long as wide; anterior margin widely rounded in dorsal and lateral views; median line distinct, parapsides rather flat; mesoscutum and mesoscutellum uniformly flat in lateral view. Propodeal and petiolar spines similar to those in worker, but distinctly shorter.

Males in ANIC spirit collection. Immature stages unknown.

**Remarks.** Forel was apparently misled by the original type locality given by Roger as Port Jackson and redescribed *P. ammonooides* from Western Australia as *P. chalchas*. He also misinterpreted the short description given by Roger and considered a series of specimens collected by E. Mjöberg at Laura, Queensland (MNHU) to be *P. ammonooides*. However, after examining these specimens, I consider they represent a new species described below as *P. cracentia*. *Polyrhachis ammonooides* is a ground-nesting species with its distribution limited to a relatively narrow band of coastal north-western Australia, from Dampier in the north almost to Perth in the south.

***Polyrhachis* (*Hagiomyrma*) *angusta* Forel, 1902 (Fig. 1E-F)**

*Polyrhachis ammon* r. *angusta* Forel, 1902: 524. Syntype workers, queens, males. Type locality: QLD, Mackay (G. Turner), MHNG, QM (examined).

*Polyrhachis* (*Hagiomyrma*) *ammon* r. *angusta* Forel. Forel, 1915: 108 (combination in *P. (Hagiomyrma)*).

*Polyrhachis angusta* Forel. Kohout, 1988: 431 (raised to species).

**Material.** QLD: Eungella NP, Broken R., 21°10'S, 148°30'E, 20.xi.1976 (RJK acc. 76.101) (w); Mon Repos Conserv. Pk, 24°48'7"S, 152°26'25"E, 25-26.i.2003 (J. Haines) (w); Taroom Distr., Boggomoss, 25°26'0"S, 150°1'0"E, 11.xi.1996-31.i.1997 (also 9.viii.-11.xi.1996) (CJB, P. Lawless, QM Party) (w); Landsborough, 10.xi.1981 (MJH) (w); Obi Obi Ck, Blackall Ra., 26.v.1962 (RWT acc. 62.1229) (w); Fraser I., Lake Wabby, 8.i.1994 (B. Hoffmann) (w); ditto, Kingfisher Resort, 19.iii.2004 (A. Andersen) (w); Boreen Point, Lake Cootharaba, 26°17'S, 153°00'E, 13.xi.1976 (RJK acc. 76.87) (w); Somerset Dam, 27°06'S, 152°33'E, 12.i.1975 (RJK acc. 75.35) (w); Boondall Wetlands, 27°20'21"S, 153°4'27"E, 22.iv.2003 (also 11.xi.2003, 20.ii.2004) (CJB, S. Wright, E. Volschenk, QM Party) (w); Brisbane Airport, 27°23'38"S, 153°5'54"E, 2-31.x.2003 (CJB, E. Vanderduys) (w); Illaweena St, Drewvale, 27°38'39"S, 153°3'47"E, 9.ix.2003 (also 5.xi.2003, 17.ii.2004) (S. Wright, QM Party) (w); Brisbane, Mt Gravatt, i.1987 (J. Gallon) (w); Moggill Farm, W of Brisbane, 23-27.i.1961 (J.L. Gressitt) (w); Lake Moogerah, 28°04'S, 152°32'E, 11.i.1975 (RJK accs 75.1, 5, 25) (w); Lamington NP, Binna Burra, 28°12'S, 153°11'E, 1.i.1974 (RJK acc. 74.1) (w). NSW: nr Taree, 25.ix.1981 (M. de Baar) (w).

**Description.** *Worker.* Dimensions (syntypes cited first): TL c. 8.12-8.52, 7.41-9.17; HL 2.07-2.12, 1.81-2.15; HW 1.69-1.71, 1.42-1.72; CI 81-82, 77-82; SL 2.52-2.57, 2.18-2.62; SI 149-152, 148-159; PW 1.06-1.25, 1.15-1.33; MW 0.62-0.70, 0.64-0.75; PMI 167-178, 172-180; MTL 2.97-3.07, 2.67-3.17 (3 + 17 measured).

Median flange of anterior clypeal margin usually with three acute teeth along its shallowly emarginate margin; laterally flange delimited by acute angles. Clypeus with distinct, median carina; sinuate in profile with relatively shallow basal margin. Frontal carinae with moderately raised margins; central area with rather flat frontal furrow. Sides of head in front of eyes converging anteriorly in almost straight line before rounding into mandibular bases; behind eyes, sides rounding into moderately convex occipital margin. Eyes situated close to occipital corners, convex,

clearly breaking lateral cephalic outline in full face view. Ocelli lacking. Pronotal dorsum virtually quadrate, only marginally wider than long; humeri dilated, rounded and dorsally shallowly concave with margins narrowly raised dorsally; lateral margins subparallel, distinctly emarginate at midlength. Promesonotal suture distinct; mesonotal dorsum with lateral margins rather strongly converging posteriorly towards dorsally indistinct metanotal groove. Propodeum with lateral margins diverging posteriorly, terminating in relatively long, slender, moderately elevated, acute spines with tips weakly turned outwards. Petiole with pair of slender, horizontal, divergent, acute spines.

Mandibles finely longitudinally striate with numerous piliferous pits towards bases. Mesosoma and petiole finely reticulate-punctate with sculpturation on head, notably on vertex and sides, somewhat coarser and organised into more-or-less distinct longitudinal pattern. Gaster finely shagreened.

Mandibles with numerous, medium length, curved, golden hairs at masticatory and outer borders; only a few closely appressed, very short hairs towards mandibular bases. Several anteriorly directed setae arising from median clypeal flange and a few very short setae fringing anterior clypeal margin. Several medium length, erect hairs on clypeus, along frontal carinae and vertex, with a few breaking occipital outline in full face view. Numerous, relatively long, erect golden hairs on most body surfaces, some almost as long as greatest diameter of eye. Hairs more numerous, but marginally shorter and posteriorly inclined on gaster. Closely appressed, rather sparse, mostly silvery pubescence on head, sides of mesosoma, petiole and venter and sides of gaster; pubescence rich golden with distinct reddish hue along midline of mesosoma and on gaster, where it forms a relatively wide, laterally diffused patch in centre of first gastral tergite that virtually hides underlying sculpturation.

Black with only mandibular teeth and condylae reddish-brown.

*Queen*. Dimensions (syntype queen cited first): TL c. 9.93, 9.83-10.43; HL 2.27, 2.18-2.27; HW 1.81, 1.72-1.81; CI 80, 78-82; SL 2.57, 2.46-2.57; SI 142, 140-144; PW 2.17, 1.87-2.17; MTL 3.02, 2.97-3.06 (8 measured).

Apart from sexual characters, very similar to worker except: pronotal humeri widely rounded with lateral margins only very narrowly raised; mesoscutum only marginally wider than long or subquadrate; anterior margin rather narrowly rounded with distinct medial line; parapsides flat. Mesoscutum virtually flat, mesoscutellum only weakly convex, not elevated above dorsal plane of mesosoma in lateral view. Propodeal dorsum evenly rounded into weakly convex declivity. Propodeal and petiolar spines slender, but distinctly shorter than in worker. Body sculpturation similar to that in worker, sculpturation on vertex and sides of head somewhat coarser. Pilosity and pubescence on head and gaster similar to that in worker, but more sporadic and shorter on dorsa of mesosoma and petiole.

Males and immature stages present in the QM collection.

**Remarks.** *Polyrhachis angusta* is very similar to *P. annuon*, however it is consistently separable by its distinctly more slender body and longer spines and hairs. The reddish-golden midline patch on dorsum of the first gastral tergite is rather narrow in dorsal view and widely bordered with very distinct, silvery, appressed pubescence. In contrast, the patch in *P. annuon* is distinctly wider, covering most of the dorsum, and is only narrowly diffused into pale golden pubescence on the sides and venter of the gaster. *Polyrhachis angusta* appears to be much less common and also more localised than the widespread *P. annuon*.

*Polyrhachis (Hagiomyrma) aurora* sp. nov.  
(Fig. 1G-H)

**Etymology.** Derived from the Latin word *aurora*, meaning dawn or morning, in reference to the distinctly bright reddish colour of the gastral pubescence.

**Material.** HOLOTYPE: QLD, Mt Elliot NP, N ridge, 790 m, 19°29'S, 146°58'E, 5.vii.1977, R.W. Taylor



acc. 77.240 (worker). PARATYPES: data as for holotype (8 workers); Mt Elliot NP, North Ck, 500–800 m, 2.xii.1986, G.B. Monteith, G.I. Thompson & S. Hamlet (8 workers). Type deposition: Holotype and 2 paratypes in ANIC; 2 paratypes each in BMNH, MCZC, MHNG, QM.

**Other Material.** QLD: 12 km W of Paluma, 3.xi.1980 (BBL) (w); Mt Spec NP, Little Crystal Ck, 14.xii.1988 (R.R. Snelling & J. Grey #88-159) (w); Mt Elliot NP, Margaret Ck, 23.ix.1995 (SKR #11) (w); Paluma Ra., Crystal Ck NP, 19°01'S, 146°16'E, 6.ix.2001 (RJK acc. 01.11) (w).

**Description.** *Worker*: Dimensions (holotype cited first): TL c. 7.41, 6.80–7.71; HL 1.87, 1.75–1.93; HW 1.40, 1.37–1.47; CI 75, 75–80; SL 2.34, 2.28–2.40; SI 165, 159–167; PW 1.40, 1.28–1.45; MW 0.65, 0.62–0.75; PMI 215, 185–215; MTL 2.53, 2.43–2.71 (11 measured).

Anterior clypeal margin with denticulate, median flange. Clypeus with raised median carina, sinuate in profile, posteriorly rounding into well impressed basal margin. Frontal carinae sinuate with moderately raised margins; central area with weakly impressed frontal furrow. Sides of head in front of eyes straight, before rounding into mandibular bases; behind eyes, sides widely rounding into convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Pronotal dorsum flat anteriorly, convex towards promesonotal suture; humeri rounded with distinctly raised margins, shallowly concave dorsally; lateral margins of promesonotum distinctly converging posteriorly (PMI >185) and weakly raised before rounding into poorly indicated metanotal groove. Propodeum with lateral margins terminating in horizontal, distinctly divergent, acute spines. Petiole with anterior face straight, posterior face strongly convex; dorsum shallowly concave with pair of laterally elevated and posteriorly curved, acute spines. Anterior face of first gastral segment widely rounding onto dorsum of gaster.

Mandibles finely, longitudinally striate with numerous piliferous pits. Clypeus very closely punctate; head reticulate-punctate, genae distinctly more coarsely sculptured. Mesosoma and petiole more finely reticulate-punctate; gaster finely shagreened.

Mandibles with numerous, semierect, short, golden hairs near masticatory borders and closely appressed hairs towards bases. Anterior clypeal margin with several anteriorly directed setae. Clypeus, frontal carinae and vertex with a few pairs of rather short, erect hairs; several longer hairs on fore coxae and distinctly short hairs on venter of trochanters and femora. Numerous short, erect, golden hairs on dorsum of gaster; longer hairs around apex and on gastral venter. Closely appressed, mostly golden pubescence with distinctly brassy hue in various densities over most dorsal body surfaces but not hiding underlying sculpturation, except on gaster where it is rather abundant and with distinct reddish tint over most of gastral dorsum; pubescence more silvery on sides of head, mesosoma, petiole and gastral venter.

Black, with only mandibular masticatory borders, condylae, extreme tip of apical funicular segments and gastral apex, reddish brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis aurora* is characterised by distinctly posteriorly converging lateral margins of the promesonotal dorsum and strongly divergent propodeal spines. It closely resembles *P. trapezoides* which shares posteriorly contracted ('trapezoidal') pronotal and mesonotal dorsa and relatively dark, somewhat brassy-coloured pilosity and pubescence. *Polyrhachis aurora* differs from *P. trapezoides* in having the propodeal spines more divergent and the petiole with a very narrowly rounded dorsum (Fig. 1G–H). In contrast, the propodeal spines in *P. trapezoides* are only weakly divergent and the dorsum of petiole is a relatively wide, posteriorly sloping platform (Fig. 13G–H). Also, the bright red pubescence that covers most of the gastral dorsum in *P. aurora*, is limited to a rather narrow median patch in *P. trapezoides*.

*Polyrhachis aurora* is only known from two closely situated localities, Mt Elliot NP and the Paluma Ra., with all collections made in grassy open forests. Its nesting habit is unknown, but as all known specimens were collected foraging on the ground it can be assumed that *P. aurora*

is a ground-nesting species, as are most other Australian *Hagiomyrma*. *Polyrhachis aurora* was listed as *P. 'Hagio 21'* by Kohout (2000: 200).

***Polyrhachis (Hagiomyrma) brisbanensis* sp. nov.**  
(Fig. 2A-B)

**Etymology.** Named after the city of Brisbane, which lies in the centre of the distribution of *P. brisbanensis*.

**Material.** HOLOTYPE: QLD, D'Aguilar Ra., Lacey's Ck Rd, 27°14'S, 152°43'E, 15.xii.1974, R.J. Kohout acc. 74.158, QM T174500 (worker). PARATYPES: data as for holotype (61 paratype workers, 1 paratype queen, 10 paratype males from the holotype colony); ditto, except RJK acc. 74.159 (55 paratype workers and 1 paratype queen). Type deposition: Holotype, most paratypes and paratype queen in QM, 3 paratype workers and paratype queen in ANIC; 2 paratype workers each in AMNH, BMNH, CASC, MCZC, MNHU, MHNG and NMNH.

**Other Material.** QLD: Fraser I., Central Stn, 25°29'S, 153°03'E, 11-12.xii.1984 (RJK acc. 84.444) (w); Cooloola SF, 23.ii.1977 (P.J.M. Greenslade) (w); 10 km N of Yarraman, 20.ix.1979 (BBL) (w); Woodford, NW of Caboolture, 31.vii.1981 (MJH) (w); Jolly's Lookout, Mt Nebo Rd, 13.v.1962 (RWT acc. 1024) (w); Brisbane, Mt Coot-tha Park, 11-19.iii.1973 (RJK accs 73.5, 15, 16, 18, 20, 41) (w, ♀); Brisbane, One Tree Hill, 12.xii.1925 (A. Musgrave) (w); Brisbane, 20.vii & 3.viii.1915 (H. Hacker) (w); Hampton-Esk Rd, 27°19'S, 153°11'E, 15.ii.1975 (RJK acc. 75.84) (w); Perseverance Ck For. Res., 27°20'57"S, 152°6'18"E, 4.xii.2003 (CJB, S. Wright, O. Seeman) (w); Buhot Ck, Burbank, 27°35'27"S, 153°10'19"E, 17.iv.2003 (also 26.v.2003, 6.xi.2003, 18.ii.2004) (CJB, S. Wright, QM Party) (w); White Rock, 27°41'50"S, 152°51'38"E, 19.iii.2005 (QM Party) (w); Spring Mtn, 27°43'17"S, 152°52'42"E, 19.iii.2005 (GBM) (w); Darlington Ra., Cedar Ck, 27°54'S, 153°11'E, 10-15.ix.1974 (RJK accs 74.87, 94, 99) (w); Mt Tambourine, x.1924 (A. Musgrave & C. Geissmann) (w); Beaudesert (S.H. Parlett) (w); Lamington NP, Binna Burra, 28°13'S, 153°11'E, c. 850m, 30.xii.1973 (RJK acc. 73.247) (♀); McPherson Range, NP, xii.1925 (A. Musgrave) (w).

**Description.** *Worker*: Dimensions (holotype cited first): TL c. 10.43, 9.42-10.58; HL 2.21, 2.15-2.37; HW 1.81, 1.65-1.87; CI 82, 76-82; SL 2.90, 2.87-3.12; SI 160, 158-174; PW 1.47, 1.40-1.72; MW 1.00, 0.97-1.15; PMI 147, 133-150; MTL 3.48, 3.38-3.68 (21 measured).

Median flange of anterior clypeal margin with usually three teeth, flanked by acute angles laterally. Clypeus with distinct, longitudinal carina, straight in profile, narrowly rounding into weakly impressed basal margin. Frontal

carinae sinuate, distinctly raised in midlength; central area with distinct frontal furrow. Sides of head in front of eyes converging towards mandibular bases in straight line; behind eyes, sides narrowly rounding into moderately convex occipital margin. Eyes convex, clearly breaking lateral cephalic outline in full face view. Ocelli lacking. Pronotal dorsum almost quadrate, only slightly wider than long; humeri widely rounded, dorsally shallowly concave, lateral margins behind humeri usually notched or shallowly emarginate and subparallel towards promesonotal suture. Mesonotal lateral margins converging posteriorly, weakly raised and rounding into poorly indicated metanotal groove. Propodeal dorsum with lateral margins subparallel, terminating in more-or-less horizontal, weakly sinuate, acute spines. Petiole armed with pair of parallel, horizontal, posteriorly directed, acute spines.

Mandibles finely longitudinally striate with numerous piliferous pits. Head and mesosoma reticulate-punctate, sculpturation on front of head and pronotal dorsum organised into somewhat longitudinally striate rugulations. Spines smooth and polished towards tips. Gaster finely shagreened.

Mandibles at masticatory borders with numerous, curved golden hairs. Anterior clypeal margin with two longer setae medially and only a few very short setae fringing margin laterally. A few, paired, medium length, erect hairs on clypeus, along frontal carinae and on vertex, no hairs breaking lateral cephalic outline. Dorsum of mesosoma and petiole, fore coxae and ventral surfaces of femora with numerous, erect and variously curved, relatively long golden hairs, longest hairs almost equal to greatest diameter of eye. Gaster with numerous, moderately long, posteriorly inclined golden hairs. Relatively abundant, appressed, golden pubescence with distinct brassy tint, somewhat medially radiating on pronotal and mesonotal dorsa; pubescence silvery and distinctly more diluted on head and sides of mesosoma. Gastral dorsum with abundant, golden-brassy pubescence virtually hiding underlying sculpturation; first gastral tergite with distinct, reddish-coloured, rather



small, median patch, surrounded by golden and diffused into silvery pubescence on sides and venter of gaster.

Black; mandibles very dark reddish-brown with narrow, transverse, light reddish band at bases of mandibular teeth. Appendages black or very dark reddish-brown.

*Queen.* Dimensions: TL c. 10.38-10.89; HL 2.09-2.15; HW 1.59-1.68; CI 76-78; SL 2.71-2.78; SI 163-172; PW 2.25- 2.37; MTL 3.33-3.53 (6 measured).

Apart from sexual characters, very similar to worker except: longitudinal clypeal carina less distinct; eyes more convex, virtually protuberant. Pronotal humeri subangular; mesoscutum as long as wide, anterior margin evenly rounded; median line distinctly bifurcate; dorsum flat with parapsides only weakly raised posteriorly. Mesoscutellum with dorsum convex, distinctly raised above dorsal plane of mesosoma. Propodeum with spines parallel, shorter than in worker; dorsum rounding evenly into virtually vertical declivity. Petiole armed with very short, posteriorly curved spines. Sculpturation, pilosity, pubescence and colour identical to that in worker.

Males and immature stages present in the QM and ANIC collections.

**Remarks.** *Polyrhachis brisbauensis* is similar to several species, notably *P. annon* and *P. brutella*. It differs from the former by its almost quadrate pronotal dorsum, closely spaced, parallel petiolar spines and the narrow patch of dark reddish pubescence on the gastral dorsum. In contrast, in *P. annon* the pronotal dorsum is rectangular and wider than long, the petiolar spines are distinctly divergent and rich golden pubescence is distributed over most of the gastral dorsum. Besides its generally smaller size (HL 2.15-2.37 in *P. brisbauensis* versus 2.28-2.56 in *P. brutella*), *P. brisbauensis* differs from *P. brutella* in several other characters, including the straight profile of the clypeus, the weakly sinuate propodeal and parallel petiolar spines and the abundant, brassy golden pubescence of the body. In contrast, the clypeus in *P. brutella* is shallowly, but distinctly concave in profile, the tips of the propodeal and petiolar spines are

curved outwards and the rather sporadic body pubescence is mostly pale silvery. Differences between the queens of the species are even more pronounced. The queen of *P. brutella* features an exceptionally massive mesosoma, which lacks any pilosity or pubescence.

*Polyrhachis brisbauensis* is a relatively common species in open eucalypt forests and woodlands of the greater Brisbane region. Its distribution extends north to Fraser Island and the Cooloola coast and south to the Queensland-New South Wales border and almost reaches the Great Dividing Range in the west. It is a ground-nesting species with nest entrances usually hidden under pieces of wood or rock. Colonies are relatively small with examined nests containing about 50-60 workers and one dealate queen.

*Polyrhachis* (*Hagiomyrma*) *brutella* sp. nov.  
(Fig. 2C-D)

**Etymology.** Derived from the Latin word *brutus*, meaning rough, in reference to the harsh conditions under which the nest of the type series was excavated from stony ground.

**Material.** HOLOTYPE: QLD, Mt Archer, nr Rockhampton, 23°20'S, 150°35'E, 6-7.iv.1981, R.J. Kohout acc. 81.35, QM T174501 (worker). PARATYPES: data as for holotype (245 workers and 1 dealate queen). Type deposition: Holotype, most paratype workers and paratype queen in QM; 2 paratype workers each in AMNH, ANIC, BMNH, CASC, MCZC, MNHU, MHNG and NMNH.

**Other material.** QLD: Hervey Ra., Turtle Rock, 19°24'S, 146°31'E, 3.vi.1996, open forest, ex nest under large rock (RJK & SKR accs 96.10, 11) (w); ditto, 24.ix.1995 (SKR #18, 19) (w); Eungella NP, 17.xii.1972 (BBL) (w); ditto, Broken R., 700 m, 21°10'S, 148°31'E, 10-12.xi.1976 (RWT & TAW acc. 76.165) (w); Britton Ra., 6 km NNE of Homevale, 21°23'S, 148°33'E, 1-6.iv.1975 (RJK accs 75.158, 161, 166) (w); 20 km S of Sarina, 18.viii.1975 (BBL) (w); Lords Table Plateau, 22°39'23"S, 148°0'51"E, 10.i-7.iii.2006 (CJB, GBM) (w); Scotts Peak, SE base, 22°51'35"S, 148°13'41"E, 9.iii.2006 (GBM, CJB) (w); Roper Ck via "Coomburralee", 22°54'5"S, 148°20'0"E, 11.i.2006 (CJB) (w); Lorna Vale, nr Marlborough, 23.v.1974 (O. Rakemann) (w); Byfield, x.1924 (H.J. Carter & A. Musgrave) (w); Palm Park, c. 5 km ESE of Byfield, 24.v.1969 (T.G. Campbell & R. Jealous) (w); 15 km SbyE of Byfield, 22°59'S, 150°41'E, 26.x.1976 (RWT & TAW acc. 76.218) (w); Mt Archer, nr Rockhampton, 23°20'S, 150°35'E, 4.xii.1976 (RJK accs 76.111, 113) (w); ditto, 6-7.iv.1981 (RJK acc. 81.36) (w, dealate ♀, larvae and pupae); Cania, 24°38'S, 150°58'E, 27.v.1972

(S.A. Harrington) (w); Carnarvon Ra., ix.1940 (S.R. Mitchell) (w); Carnarvon Gorge, 24.v-2.vi.1954 (E. Exley) (w).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 10.89, 10.28-11.54; HL 2.50, 2.28-2.62; HW 2.02, 1.84-2.12; CI 81, 78-82; SL 3.43, 3.12-3.53; SI 170, 155-181; PW 1.72, 1.53-1.72; MW 1.25, 1.15-1.31; PMI 138, 125-142; MTL 4.03, 3.88-4.28 (26 measured).

Anterior clypeal margin with median flange, laterally flanked by blunt angles. Clypeus with distinct longitudinal carina, sinuate in profile, posteriorly narrowly rounding into weakly impressed basal margin. Frontal carinae sinuate with moderately raised margins. Sides of head in front of eyes converging towards mandibular bases in virtually straight line; behind eyes, sides abruptly rounding into only moderately convex occipital margin. Eyes convex, clearly breaking lateral cephalic outline in full face view. Ocelli lacking. Pronotal dorsum almost quadrate, only marginally wider than long, lateral margins more-or-less parallel, usually narrowly emarginated or notched at midlength; humeri rounded with raised margins, weakly concave dorsally. Mesonotal margins weakly raised, converging into weakly indicated, posteriorly bowed metanotal groove. Propodeal dorsum relatively short, rounding into steep, convex declivity; lateral margins terminating in long, slender spines, with tips bent outwards. Petiolar spines sinuate, subparallel or even weakly posteriorly converging, with tips bent weakly outwards and upwards.

Mandibles longitudinally striate with numerous piliferous pits. Head and mesosoma finely reticulate-punctate, with sculpturation irregularly longitudinal along frontal carinae and on vertex; more coarsely sculptured on sides of head. Gaster finely shagreened.

Mandibles with numerous curved, golden hairs at masticatory borders and along outer borders. Anterior clypeal margin with only a few, anteriorly directed setae medially and very short setae laterally. Several pairs of medium length, golden hairs on clypeus, along frontal carinae and on vertex. Numerous, relatively long hairs on dorsum of mesosoma and

petiole, fore coxae and along ventral surfaces of femora. Gaster with numerous, posteriorly inclined, medium length, golden hairs. Closely appressed, mostly silvery pubescence in various densities over most body surfaces, with somewhat pale golden hue along median line of mesosoma; first gastral tergite with distinct, reddish-brown coloured, median patch of pubescence, diffused laterally into rich golden pubescence that blends into silvery on sides and venter of gaster.

Black, with only mandibles dark reddish-brown.

*Queen.* Dimensions: TL c. 10.84-12.25; HL 2.25; HW 1.72; CI 76; SL 2.92-3.03; SI 170-176; PW 2.59-2.84; MTL 3.73-3.88 (2 measured).

Apart from sexual characters and larger size, similar to worker, except: longitudinal clypeal carina indistinct; sides of head in front of eyes subparallel, very weakly concave; eyes distinctly more convex, virtually protuberant. Pronotal humeri subangular; mesoscutum rather massive, as long as wide with anterior margin widely rounded; median line distinctly bifurcate; dorsum flat with parapsides only weakly raised posteriorly. Mesoscutellum with dorsum convex, distinctly raised above dorsal plane of mesosoma. Propodeum with spines weakly divergent, shorter than in worker; dorsum rounding evenly into virtually vertical declivity. Petiole armed with very short, posteriorly and weakly inwardly curved spines. Sculpturation, pilosity, pubescence and colour identical to that in worker, except virtual lack of pilosity and pubescence on dorsum of mesoscutum.

Males and immature stages (eggs, larvae and pupae from holotype colony) present in the QM collection.

**Remarks.** *Polyrhachis brutella* is similar to *P. brisbanensis* but is generally larger (HL 2.28-2.56 in *P. brutella* versus HL 2.15-2.37 in *P. brisbanensis*), with most of the distinguishing characters given in the remarks section under the latter. Other characters specific to *P. brutella* include the lack of a light band at the bases of mandibular teeth, the blunt lateral angles of the



anterior flange of the clypeus, the subparallel, undilated lateral margins of the pronotal dorsum, the distinctly sinuate petiolar spines with their tips bent outwards, the distinctly shorter pilosity and the very short, rather diluted body pubescence, notably on the pronotal and mesonotal dorsa. The gastral pubescence in both species is pale gold or silvery, with an almost identical median patch on first gastral tergite.

The distribution of *P. brutella* extends from Eungella National Park south to Rockhampton and as far west as Canarvon National Park, with an apparently isolated population at Turtle Rock in the Hervey Range near Townsville. Specimens from the latter population closely resemble those from Mt Archer, except in having marginally shorter antennal scapes (SI 156-164 in specimens from Turtle Rock versus 167-181 in other specimens) and a wider petiolar dorsum with divergent petiolar spines that have their base more widely separated. *Polyrhachis brutella* inhabits open eucalypt forests, seemingly preferring rocky ground in which to build their nests. Two of the nests dug up at the type locality had their tunnels excavated along and under large boulders with the lowest chambers reaching a depth of about 50-70cm. The Turtle Rock population of *P. brutella* was listed earlier as '*Hagio 16*' by Kohout, 2000: 200).

*Polyrhachis* (*Hagiomyrma*) *burwelli* sp. nov.  
(Fig. 2E-F)

**Etymology.** Named in honour of my colleague, Dr Chris Burwell of the Queensland Museum, in appreciation of his continuing support of my work on Australian *Polyrhachis*.

**Material.** HOLOTYPE: QLD, Mt Abbot, summit area, 20°06'S, 147°45'E, 750-1000 m, 8-10.xii.1996, G.B. Monteith & I. Cook, QM T174502 (worker). PARATYPES: data as for holotype (2 workers). Type deposition: Holotype and 1 paratype worker in QM; 1 paratype worker in ANIC.

**Other material.** QLD: Mt Abbot, Nova Ridge, 20.098°S, 147.756°E, 850 m, 28.ix.2011, B. Nolan #34970 (1 worker).

**Description.** *Worker:* Dimensions (holotype cited first): TL c. 9.98, 9.73-10.68; HL 2.31, 2.18-2.34; HW 1.96, 1.81-1.96; CI 85, 82-85; SL 3.09, 2.87-3.12; SI 158, 157-159; PW 1.56, 1.47-1.68;

MW 1.18, 1.09-1.25; PMI 132, 132-135; MTL 3.83, 3.63-3.83 (3 measured).

Anterior clypeal margin with median, shallowly emarginate, denticulate flange, laterally delimited by acute teeth. Clypeus with median longitudinal carina; weakly sinuate in profile, posteriorly gently rounding into moderately impressed basal margin. Frontal carinae sinuate with distinctly raised margins; central area with shallowly impressed frontal furrow. Sides of head in front of eyes converging towards mandibular bases in very weakly convex line; behind eyes, sides rather narrowly rounding into shallowly convex occipital margin. Eyes convex, situated near occipital corners; in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Pronotal dorsum virtually quadrate with humeri rounded, dorsally shallowly concave; lateral margins narrowly raised, distinctly emarginate at midlength, widely rounding into laterally deeply impressed promesonotal suture. Mesonotum with lateral margins converging posteriorly towards shallow, but distinct metanotal groove. Propodeal dorsum with lateral margins subparallel, widening posteriorly and terminating in relatively broad-based, divergent, acute spines; spines weakly dorso-posteriorly raised at bases and gently turned downwards at midlength. Petiolar node relatively broad in profile with anterior face weakly and posterior face distinctly convex; spines relatively short, widely divergent, with bases situated well below apex of dorsal convexity; length of spines less than one third of distance between tips. Anterior face of first gastral segment widely rounding onto dorsum of gaster.

Mandibles longitudinally striate-rugose with numerous piliferous pits. Mesosoma and petiole finely, head somewhat more coarsely, reticulate-punctate. Gaster shagreened.

Mandibles with numerous, semierect, curved, golden hairs. Medium length, erect hairs on clypeus, along frontal carinae and on vertex, no hairs evident on sides of head between occipital corners and mandibular bases in full face view. Numerous long, erect, golden hairs on dorsum of mesosoma, coxae,

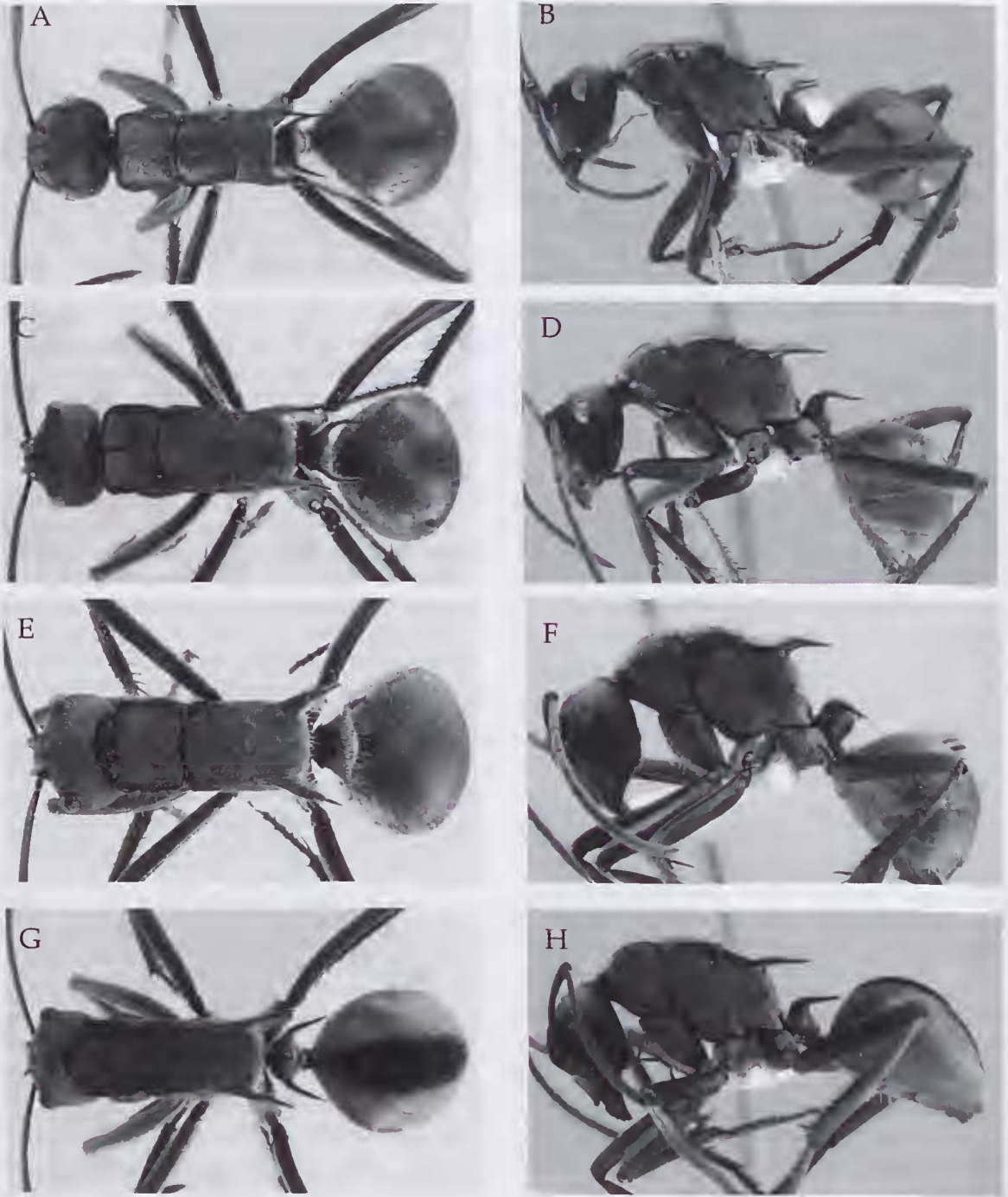


FIG. 2. *Polyrhachis* (*Hagiomyrma*) *ammon* species-group – dorsal (left) and lateral (right) view. A–B, *P. brisbanensis* sp. nov.; C–D, *P. brutella* sp. nov.; E–F, *P. burwelli* sp. nov.; G–H, *P. callima* sp. nov. (not to scale).



venter of femora, petiole and gaster, most hairs longer than greatest diameter of eyes. Silvery or pale golden, appressed pubescence in various densities over most body surfaces, with golden tint on pronotal and mesonotal dorsa. Gastral dorsum with pubescence virtually hiding underlying sculpturation; pubescence rich golden with reddish hue along midline, silvery on gastral sides and venter.

Black with only condylae and apical tarsal segments reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis burwelli* is a very distinctive species, characterised by its broad petiolar node with a widely rounded dorsum. It is known only from the type locality and, in spite of two extensive surveys at Mt Abbot and neighbouring Mt Aberdeen (west of Bowen), the types are the only known specimens of this apparently rare species.

A single worker (see under 'Other material') differs from the specimens of the type series in a virtual lack of any hairs on head, mesosoma and petiole and with only relatively short, erect hairs lining abdominal segments. The closely appressed, silvery pubescence completely absent from the head, dorsum and sides of mesosoma, with only diluted, silvery pubescence on propodeal declivity, petiole and sides and venter of gaster. Gastral dorsum with rich golden with reddish hue, similar to that in specimens of the type series.

*Polyrhachis* (*Hagiomyrma*) *callima* sp. nov.  
(Fig. 2G-H)

**Etymology.** Derived from the Greek word *kalos*, meaning beautiful.

**Material.** HOLOTYPE: QLD, Expedition Ra., Blackdown Tblld, nr Lookout Pt, 23°45'S, 149°07'E, 4.iv.1981, R.J. Kohout acc. 81.12, QM T174503 (worker). PARATYPES: data as for holotype (126 workers, 1 dealate queen, 1 male from holotype colony). Type deposition: Holotype, most paratype workers, paratype dealate queen and male in QM; 4 paratype workers in ANIC, 2 paratype workers each in BMNH, CASC, MCZC, MHNG and NMNH.

**Other Material.** QLD: Expedition Ra., Blackdown Tblld, nr Lookout Pt, 23°45'S, 149°07'E, 4-6.iv.1981

(RJK accs 81.3, 4, 30) (w); Blackdown Tblld, SEbyE of Blackwater, Horseshoe Lookout, 23°46'S, 149°06'E, 4.vii.1980 (Balderson & Vickery) (w); Mt Moffatt NP, Peawaddy Gorge, 12.xii.1987 (J. Gallon) (w); ditto, Park Headquarters, 25°01'S, 147°47'E, 740 m, 17.xi.1995 (CJB) (w); Mahogany Forest, 1000 m, 11-12.xii.1987 (GBM, GIT & DKY) (w); Marlong Arch, 23.ix.1986 (GBM, GIT & DKY) (w); Top shelter shed, 1000 m, 10-12.xii.1987 (GBM, GIT & DKY) (w, ♀); The Chimneys, 14.xii.1987 (GBM, GIT & DKY) (w); Carnarvon Gorge NP, 24.v-2.vi.1954 (E. Exley) (w).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 12.20, 10.89-12.20; HL 2.71, 2.56-2.71; HW 2.06, 1.93-2.06; CI 76, 74-79; SL 3.73, 3.43-3.73; SI 181, 171-183; PW 1.65, 1.53-1.65; MW 1.31, 1.25-1.31; PMI 126, 124-130; MTL 4.89, 4.54-4.89 (21 measured).

Anterior clypeal margin with median, denticulate flange, flanked laterally by acute angles. Clypeus with median carina; in profile distinctly concave anteriorly, straight posteriorly towards virtually flat basal margin. Frontal triangle shallowly impressed. Frontal carinae with raised margins; central area relatively wide and flat with frontal furrow replaced with weakly raised ridge. Sides of head in front of eyes converging towards mandibular bases in virtually straight line; behind eyes, sides converging into weakly convex occipital margin. Eyes situated close to occipital corners, convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with humeri moderately dilated, rounded, with upturned margins; lateral margins behind humeri weakly notched, parallel towards promesonotal suture. Mesonotal dorsum with posteriorly converging margins; metanotal groove distinct. Propodeum with lateral margins terminating in moderately divergent acute spines, tips weakly turned outwards; propodeal dorsum widely rounding into distinctly convex propodeal declivity. Petiole with dorsum narrowly rounded, armed with divergent, acute spines. Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles finely longitudinally striate with numerous piliferous pits. Head and mesosoma very finely and closely reticulate-punctate. Gaster finely shagreened.

Mandibles with numerous medium length, golden hairs, distinctly longer at masticatory borders, shorter towards mandibular bases. Numerous, anteriorly directed setae fringing anterior clypeal margin. Several, rather long hairs on clypeus, along frontal carinae and vertex, but no hairs breaking lateral outline of head in full face view. Numerous, pale golden or silver, erect and somewhat undulated hairs, longer than greatest diameter of eyes on dorsum of mesosoma, front coxae and petiole; somewhat shorter hairs on middle and hind coxae. Gaster with numerous, golden, posteriorly inclined hairs, longest on gastral venter and around apex where they exceed greatest diameter of eyes. Very sparse, closely appressed, mostly silvery pubescence on dorsum of mesosoma; pubescence more abundant on sides of mesosoma and petiole. Abundant, closely appressed, somewhat medially radiating pubescence over all gastral surfaces, obscuring underlying sculturation; pubescence silvery on venter, rich golden with distinct, dark reddish-brown, median patch on gastral dorsum (Fig. 2G).

Black with only mandibles very dark reddish brown; condylae medium reddish-brown.

*Queen.* Dimensions: TL c. 12.25-12.60; HL 2.37-2.40; HW 1.81; CI 75-76; SL 3.12-3.28; SI 172-181; PW 2.96-3.18; MTL 4.08-4.38 (3 measured).

Apart from sexual characters, very similar to worker except: pronotal dorsum with humeri subacute, widely rounded posteriorly. Mesoscutum distinctly wider than long; anterior margin evenly rounded; median line distinct, bifurcate; parapsides rather flat; dorsum of mesoscutum flat in lateral view; mesoscutellum convex, distinctly raised above dorsum of mesoscutum. Propodeal and petiolar spines similar to those in worker, but distinctly shorter. Pale golden and silvery, erect hairs over most body surfaces, rather short on dorsum of mesoscutum, distinctly longer on mesoscutellum; appressed pubescence very similar to worker with identical patch on gastral dorsum.

Male and immature stages (larvae and pupae from holotype colony) present in the QM spirit collection.

**Remarks.** At the type locality, *Polyrhachis callima* was sympatric with *P. conciliata* described below. These species are superficially very similar and I originally considered them to represent a single species. However, closer examination revealed several characters clearly separating them. The most apparent difference is their pilosity which, in *P. callima*, is distributed almost evenly over the entire dorsum of the body, with the longest hairs reaching or exceeding the greatest diameter of the eyes in length. In contrast, the pilosity in *P. conciliata* is distinctly shorter and completely absent from the mesonotal and propodeal dorsa. Nests of *P. callima*, which are identical to those of *P. conciliata*, are excavated in soil with entrances under pieces of wood, stone, or beneath tufts of grass. The holotype colony, which was almost completely excavated, contained 129 ants, including a dealate queen and a male.

*Polyrhachis (Hagiomyrma) conciliata* sp. nov.  
(Fig. 3A-B)

**Etymology.** Derived from the Latin word *concilium*, meaning assembly, meeting, referring to its close association with *P. callima* described above.

**Material.** HOLOTYPE: QLD, Expedition Ra., Blackdown Tld, 23°48'S, 149°04'E, 4.iv.1981, R.J. Kohout acc. 81.11, QM T174504 (worker). PARATYPES: data as for holotype (92 workers and 1 dealate queen from holotype colony). Type deposition: Holotype, most paratype workers and paratype queen in QM; 4 paratype workers in ANIC; 2 paratype workers each in AMNH, BMNH, MCZC, MHNG and NMNH.

**Other Material.** QLD: Expedition Ra., Blackdown Tld, 23°48'S, 149°04'E, 1-6.ii.1981 (GBM) (w, ♀); ditto, nr Lookout Pt, 23°45'S, 149°07'E, 4-6.iv.1981 (RJK accs 81.10, 14), (w); ditto, Mimosa Ck x-ing, 5.iv.1981 (RJK accs 81.15, 17, 19, 22, 24, 27) (w, ♀); Mt Moffat NP, Dargonelly Rockhole, 20-27. ix.1986 (GBM, DKY & GIT) (w); Kenniff's Lookout, 13.xii.1987 (GBM, DKY & GIT) (w); Claravale, 45 km NE of Mitchell, xi.2002 (T. Hardaker) (w).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 11.09, 10.28-11.24; HL 2.56, 2.37-2.56; HW 2.03, 1.81-2.06; CI 79, 76-82; SL



3.33, 3.07-3.33; SI 164, 157-178; PW 1.68, 1.48-1.68; MW 1.27, 1.15-1.28; PMI 132, 122-139; MTL 4.33, 3.93-4.33 (26 measured).

Anterior clypeal margin with median, denticulate flange, laterally flanked by acute, laterally directed teeth. Clypeus with median carina; in profile shallowly concave anteriorly, straight posteriorly towards virtually flat basal margin. Frontal triangle shallowly impressed. Frontal carinae with raised margins; central area relatively wide and flat with frontal furrow replaced with weakly raised ridge. Sides of head in front of eyes converging towards mandibular bases in virtually straight line; behind eyes, sides converging into weakly convex occipital margin. Eyes situated close to occipital corners, convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with humeri moderately dilated, rounded with upturned margins; lateral margins behind humeri weakly notched in some specimens, parallel towards promesonotal suture. Mesonotal dorsum with posteriorly converging margins. Propodeum with lateral margins divergent, terminating in subparallel, acute spines, tips weakly turned outwards; propodeal dorsum widely rounding into distinctly convex propodeal declivity. Petiole with dorsum narrowly rounded, weakly convex medially, armed with divergent, acute spines. Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles finely longitudinally striate with numerous piliferous pits. Head and mesosoma very finely and closely reticulate-punctate with sculpturation on sides of head somewhat more distinct. Gaster finely shagreened.

Mandibles with numerous medium length, golden hairs, distinctly longer at masticatory borders, shorter towards mandibular bases. Numerous, anteriorly directed setae fringing anterior clypeal margin. Several medium length hairs on clypeus, along frontal carinae and vertex, but no hairs breaking lateral outline of head in full face view. Several, medium length, semierect golden hairs on pronotal dorsum; long hairs, almost reaching greatest diameter of eyes in length, on anterior aspect of

front coxae; somewhat shorter hairs on middle and hind coxae, below propodeal spiracles and on petiolar dorsum. Mesonotal and propodeal dorsa completely without hairs. Gaster with numerous, golden, posteriorly inclined hairs, longest on gastral venter and around apex, almost reaching greatest diameter of eyes in length. Very sparse, closely appressed, mostly silvery pubescence on dorsum of mesosoma; pubescence more abundant on head, sides of mesosoma and petiole. Abundant, closely appressed, somewhat medially radiating pubescence over all gastral surfaces, obscuring underlying sculpturation; pubescence silvery on venter, rich golden with distinct, dark reddish-brown, median patch on gastral dorsum (Fig. 3A).

Black with only mandibles very dark reddish brown; condylae medium reddish-brown.

*Queen.* Dimensions: TL c. 12.20-12.65; HL 2.18-2.25; HW 1.75-1.68; CI 74-79; SL 2.87-2.91; SI 164-174; PW 2.70-2.74; MTL 3.83-3.88 (3 measured).

Apart from sexual characters, similar to worker except: pronotal dorsum with humeri narrowly rounded, margins shallowly emarginate posteriorly. Mesoscutum virtually as long as wide; anterior margin evenly rounded; median line distinct, bifurcate anteriorly; parapsides rather flat; mesoscutum flat in lateral view, mesoscutellum convex, distinctly elevated above dorsal plane of mesoscutum. Propodeal and petiolar spines similar to those in worker, but distinctly shorter. Pale golden and silvery, very short, erect hairs on most body surfaces; appressed pubescence very similar to worker with identical patch on gastral dorsum.

Males unknown. Immature stages (eggs, larvae and pupae) in QM spirit collection.

**Remarks.** *Polyrhachis conciliata* is very similar to *P. callima* described above, with distinguishing characters given under the latter species. Workers of both species have been collected in close proximity and, at the type locality, their nests were located only a few metres apart. They nest in soil with the entrances covered by a stone or piece of wood.

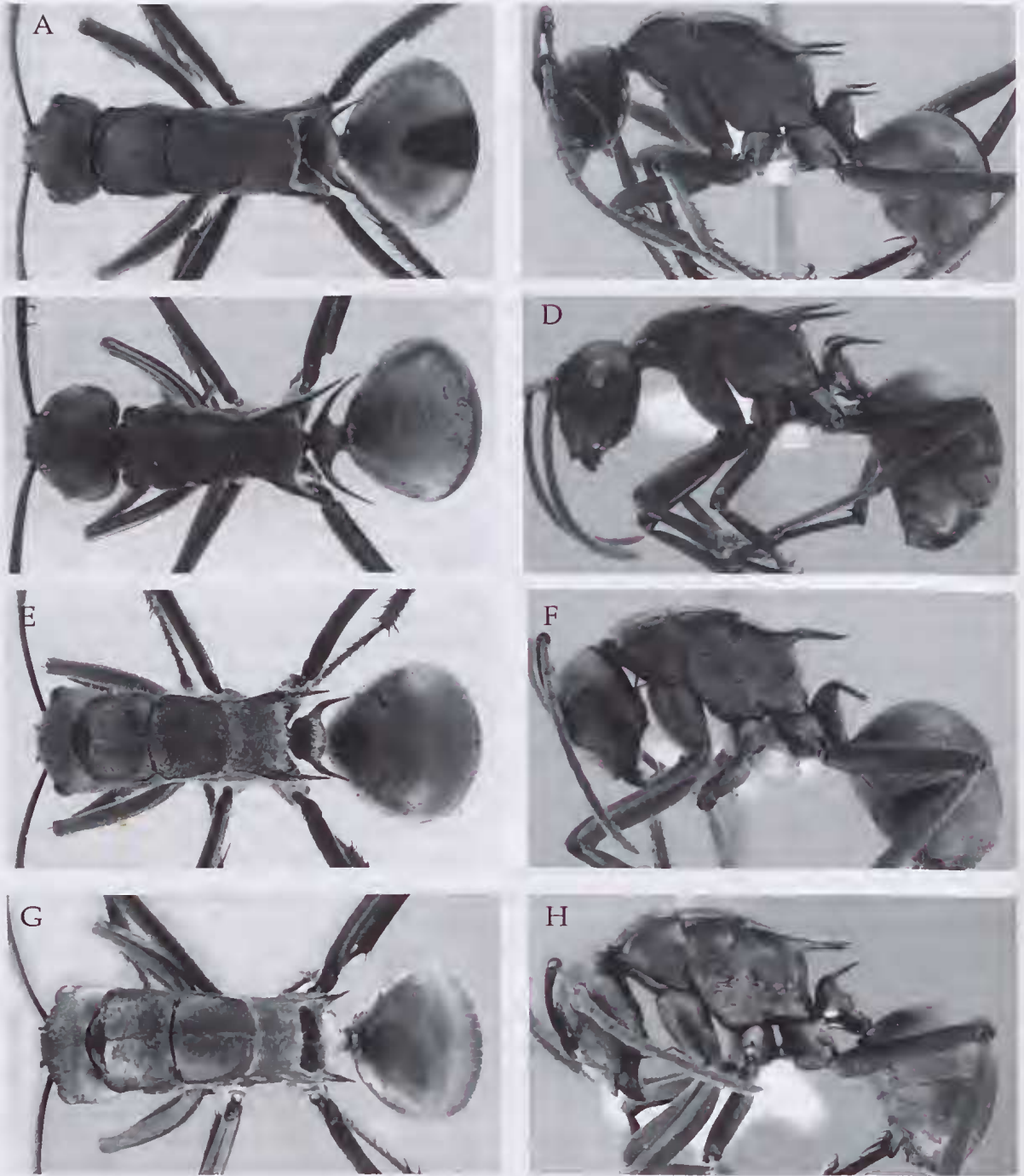


FIG. 3. *Polyrhachis* (*Hagiomyrma*) *ammon* species-group – dorsal (left) and lateral (right) view. A–B, *P. conciliata* sp. nov.; C–D, *P. cracentia* sp. nov.; E–F, *P. dougcooki* sp. nov.; G–H, *P. elegantula* sp. nov. (not to scale).



***Polyrhachis* (*Hagiomyrma*) *cracenta* sp. nov.**  
(Fig. 3C-D)

**Etymology.** Derived from the Latin word *cracens*, meaning graceful, for its elegant appearance.

**Material.** HOLOTYPE: QLD, Mt Elliot NP, 22 km SW of Giru, 25.v.1980, B.B. Lowery (worker). PARATYPES: data as for holotype (30 paratype workers, 2 paratype alate queens). Type deposition: Holotype, most paratype workers and 1 paratype queen in ANIC; 3 paratype workers and 1 paratype queen in QM; 2 paratype workers each in AMNH, BMNH, CASC, MCZC, NMNH; 1 paratype worker in MSNG, MHNG, MNHU and NHMW.

**Other Material.** WA: Kimberley Distr., Mitchell Plateau, 4 km SbyW of Mining Camp, 14°52'S, 125°50'E, 13.v.1983 (D.C.F. Rentz & J. Balderson) (♀). NT: Arnhem Land, Birany Birany, 10.xi.2004 (BDH) (w); ditto, Balkbalkbuy, 53 km SW of Nhulunbuy 12°35'S, 136°31'E, 1.xi.2005 (BDH) (w); Gorathia, 90 km SW of Nhulunbuy, 12°35'S, 136°33'E, 11.xi.2007 (BDH) (w); Virginia, E of Darwin, 25.ii.1992, at light (BDH) (♀). QLD: Cape York Pen., Laura (E. Mjöberg) (w); Mareeba, 16.vi.1937 (T. Greaves) (w); 5 km N of Innisfail, 5.viii.1975, on tree (BBL) (w); Townsville, 25.ix.1919 (G.F. Hill) (w, ♀); Townsville, 30.i.1902 (F.P. Dodd) (w); Mackay (W.W. Froggatt) (w); Mackay, viii.1894 (G. Turner) (w).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 8.97, 7.81-9.02; HL 2.09, 1.93-2.12; HW 1.81, 1.62-1.81; CI 87, 83-89; SL 2.59, 2.34-2.62; SI 143, 143-149; PW 1.28, 1.18-1.31; MW 0.84, 0.75-0.84; PMI 152, 152-160; MTL 3.09, 2.78-3.09 (19 measured).

Anterior clypeal margin medially with shallow, truncate, denticulate flange, flanked by rather blunt teeth. Clypeus with distinctly raised median carina; sinuate in profile with shallowly impressed basal margin. Frontal triangle poorly indicated. Frontal carinae sinuate with moderately raised margins; central area relatively wide with rather flat frontal furrow. Sides of head in front of eyes very weakly convex towards mandibular bases; behind eyes, sides rounding into convex occipital margin. Eyes moderately convex, in full face view marginally breaking lateral cephalic outline. Ocelli lacking; their position indicated by minute elevations in cephalic sculpture. Pronotal humeri distinctly dilated, rounded with raised lateral margins, dorsally shallowly concave; pronotal dorsum with lateral margins distinctly emarginate or

notched at about midlength, weakly divergent towards promesonotal suture. Lateral margins of mesonotum converging posteriorly and weakly raised towards laterally impressed, medially flat metanotal groove. Propodeal dorsum with margins terminating in broad-based, very long and slender, widely divergent, acute spines. Anterior face of petiole in profile rounding dorsally into long, slender, widely divergent spines; propodeal dorsum deeply concave between spines. Base of first gastral segment widely rounding onto dorsum.

Mandibles distinctly longitudinally striate with numerous piliferous pits. Head and mesosoma very finely and closely reticulate-punctate with sculpturation on sides of head somewhat more distinct; spines highly polished. Gaster finely shagreened.

Mandibles with several medium length, golden hairs at masticatory borders. Only a few anteriorly directed setae fringing anterior clypeal margin medially. Posterior face of fore coxae, gastral venter and apex with medium length, semierect, golden hairs. Whole dorsum of body, including head, mesosoma, petiole and gaster without hairs, except a few, short hairs on apical gastral tergites. Very short, closely appressed, silvery pubescence rather sporadic on venter of head, propodeal declivity, venter and sides of gaster; pubescence completely absent from most dorsal surfaces, except dorsum of gaster, where it is uniformly golden and rather abundant, completely hiding underlying sculpturation.

Black; narrow band across mandibular teeth and condylae reddish-brown.

**Queen.** Dimensions: TL c. 9.42-9.52; HL 2.00-2.09; HW 1.62-1.72; CI 80-82; SL 2.28-2.40; SI 137-143; PW 2.03-2.21; MTL 2.74-2.90 (5 measured).

Apart from sexual characters, very similar to worker except: pronotal dorsum with humeri subacute, margins widely rounded posteriorly. Mesoscutum distinctly wider than long; anterior margin evenly rounded; median line distinct, bifurcate dorsally; parapsides flat anteriorly, weakly raised posteriorly; dorsum of

mesoscutum and mesoscutellum forming very weakly convex line in lateral view. Propodeal and petiolar spines similar to those in worker, but distinctly shorter. Sculpturation, pilosity, pubescence and colour virtually identical to worker.

Male and immature stages unknown.

**Remarks.** *Polyrhachis cracenta* is very similar to *P. crawleyi* but is easily separated by its consistently larger size (HL 1.93-2.12 in *P. cracenta* versus 1.66-1.84 in *P. crawleyi*) and its unique superficially glabrous appearance. It is evidently a rare species that has been collected only on a few occasions. Specimens collected by Mjöberg near Laura on Cape York Peninsula, were erroneously identified by Forel (1915) as *P. ammonoeides* Roger and as a result, he described a closely similar species, *P. crawleyi*, as a variety of *ammonoeides*. Like most *Hagiomyrma* species, it is a ground-nesting species, apparently preferring the bases of trees as nesting sites ('nest at base of small sapling' [G.F. Hill]; 'extensive diggings all round small paperbarks' [B.B. Lowery]).

*Polyrhachis cracenta* is one of several *Polyrhachis* species which were originally collected at Townsville and other north Queensland localities by F.P. Dodd and other early collectors (see above) and were subsequently located in the Northern Territory (i.e. *P. lysistrata* Santschi, *P. prometheus* Santschi and *P. incerta* Kohout (= '*P. micans ops rufa*' Crawley). *Polyrhachis cracenta* was listed as *P. 'Hagio 03'* by Kohout (2000: 199).

*Polyrhachis (Hagiomyrma) dougcooki* sp. nov.  
(Fig. 3E-F)

**Etymology.** Named in honour of the collector, Doug Cook, a long time associate of the Queensland Museum, who collected many species of *Polyrhachis* and other insects on numerous collecting trips to remote localities in Queensland.

**Material.** HOLOTYPE: QLD, Hann Tbl'd (Nth End), 16°48'S, 145°10'E, 950-1000 m, 11-14.xii.1995, G.B. Monteith, G.I. Thompson & D.J. Cook, QM T174505 (worker). PARATYPES: data as for holotype (10 workers, 1 alate ♀). Type distribution: Holotype, 3 paratype workers and paratype ♀ in QM; 2 paratypes each in ANIC, BMNH, MCZC; 1 paratype worker in MHNG.

**Description.** *Worker*: Dimensions (holotype cited first): TL c. 10.03, 9.37-10.23; HL 2.31, 2.21-2.40; HW 1.81, 1.72-1.86; CI 78, 76-78; SL 3.07, 2.95-3.12; SI 170, 168-173; PW 1.53, 1.47-1.59; MW 1.03, 1.03-1.15; PMI 148, 135-150; MTL 3.73, 3.53-3.78 (8 measured).

Anterior clypeal margin with denticulate median flange, laterally flanked by acute teeth. Clypeus with median carina, sinuate in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with moderately raised margins. Sides of head in front of eyes converging towards mandibular bases in straight line; behind eyes, sides widely rounding into occipital margin. Eyes moderately convex, in full face view marginally exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum quadrate; pronotal humeri rounded, lateral margins weakly emarginate behind humeri and subparallel towards well impressed promesonotal suture. Mesonotal dorsum with lateral margins converging posteriorly; metanotal groove indistinct. Propodeal margins terminating in rather strong, subparallel spines, with bases weakly elevated and sinuate towards tips in side view. Petiole armed with pair of horizontal, weakly divergent spines. Anterior face of first gastral tergite higher than full height of petiole, widely rounding onto dorsum.

Mandibles finely and densely striate-rugose with numerous piliferous pits. Head and mesosoma reticulate-punctate, sculpturation almost completely hidden by overlying pubescence. Spines rugose with tips rather smooth and polished. Gaster finely shagreened.

Mandibular masticatory borders with numerous, medium length golden hairs. Anterior clypeal margin medially with several longer setae and fringe of shorter setae laterally. Numerous medium length hairs on clypeus, along frontal carinae and vertex, but no hairs breaking lateral cephalic outline. Somewhat longer, more abundant, variously curved hairs on dorsum of mesosoma, petiole and spines, excluding extreme tips. Gaster with abundant, erect or posteriorly inclined, golden



hairs, longest hairs reaching greatest diameter of eyes in length. Relatively long, closely appressed, golden pubescence with somewhat reddish hue, over most dorsal body surfaces; pubescence more abundant and distinctly medially radiating on mesosomal dorsum, silvery on sides. Gastral pubescence somewhat longer and more abundant dorsally where it completely hides underlying sculpturation; pubescence silvery on gastral venter and sides, rich golden with distinct reddish hue on dorsum.

Black throughout.

**Queen.** Dimensions: TL c. 10.68; HL 2.23; HW 1.78; CI 76; SL 2.93; SI 165; PW 2.34; MTL 3.68 (1 measured).

Apart from sexual characters, very similar to worker except: mesoscutum only marginally wider than long with anterior margins widely rounded; medial line bifurcate dorsally; dorsum relatively low and virtually flat in lateral view with parapsides only weakly raised posteriorly. Mesoscutellum not elevated above dorsal plane of mesosoma. Spines similar to those in worker, but marginally shorter. Sculpturation, pilosity, pubescence and colour virtually identical to worker, except mandibles in single available queen dark reddish-brown.

Male and immature stages unknown.

**Remarks.** *Polyrhachis dougcooki* closely resembles *P. ammon* but differs by its distinctly longer antennal scapes (SI 168-173 in *P. dougcooki* versus 145-155 in *P. ammon*) and relatively small, virtually quadrate pronotal dorsum. The pilosity in *P. dougcooki* is distinctly longer and the somewhat brassy golden pubescence is denser and covers the whole body, including the head. In contrast the pilosity in *P. ammon* is distinctly shorter and the more appressed golden pubescence is virtually absent from the head. *Polyrhachis dougcooki* was listed earlier by Kohout (2000: 200) as '*Hagio 20*'.

*Polyrhachis* (*Hagiomyrma*) *elegantula* sp. nov.  
(Fig. 3G-H)

**Etymology.** Derived from the Latin word *elegantulus*, meaning fine, graceful, in reference to the species

somewhat elegant appearance, given by the very tidy, closely appressed pubescence.

**Material.** HOLOTYPE: QLD, Cape York Pen., Iron Ra., 12°43'S, 143°18'E, 26-31.vii.1981, R.J. Kohout acc. 81.203, QM T174506 (worker). PARATYPES: data as for holotype (33 workers); Type deposition: Holotype and most paratypes in QM; 2 paratypes each in AMNH, ANIC, BMNH, CASC, MCZC, MHNG and NMNH.

**Other Material.** QLD: Cape York, Somerset, 10°45'S, 142°36'E, 7-12.vii.1976 (E. Cameron) (w); Cape York Pen., 10 km N of Bamaga, 25.viii.1972 (R. Jenkins) (w); Bamaga, 10°53'S, 142°23'E, 10-24.iii.1987 (RJK accs 87.76, 79) (w); Andoom, nr Weipa, 12°29'S, 141°50'E, ii.1975 (GBM) (w); Iron Ra., 12°42'S, 143°18'E, 9-15.vi.1971 (RWT & JEF acc. 71.244) (w); ditto, 1-9.vi.1971 (GBM) (w); Mt Lamond, 12°44'S, 143°18'E, 9-15.vi.1971 (RWT & JEF acc. 71.257) (w); Tozer's Gap, 12°45'S, 143°12'E, 9-15.vi.1971 (RWT & JEF acc. 71.273) (w); McIlwraith Ra., 13°45'S, 143°21'E, c. 510 m, 22-27.vii.1977 (RWT acc. 77.557) (w); 3.5 km SWbyS of Mt Baird, 15°10'S, 145°07'E, 3-5.v.1981 (JEF) (w); 1 km N of Rounded Hill, 15°17'S, 145°13'E, 5-7.v.1981 (JEF) (w); Isabella Falls, 45 km NW of Cooktown, 21.vii.2002 (ANA) (w); Black Mtn, NW base, 15°40'S, 145°13'E, 10.vi.1996 (CJB) (w); Mt Cook, nr Cooktown, 17.vii.2002 (ANA) (w); Home Rule, 15°45'S, 145°17'E, c. 200 m, 9-11.vi.1996 (RJK acc. 96.43) (w); Mt Hartley, 15°46'S, 145°19'E, 200-500 m, 11.vi.1996 (CJB) (w); c. 10 km NW of Ellis Bch, 16°40'S, 145°34'E, <20 m, 8.vi.1996, open forest (RJK & CJB acc. 96.33) (w); Cairns, 7.x-2.xi.1914 (W.M. Wheeler) (w); c. 6 km W of Sth Mission Beach, 17°56'S, 146°02'E, 18-19.vii.1980 (RJK acc. 80.62) (w); Porter Ck, 23 km SE of Cardwell, 18°26'S, 146°08'E, 26.ii.2000 (RJK acc. 2000.66) (w); Hinchinbrook I., v.1998 (A.D. Cutter) (w).

**Description.** *Worker:* Dimensions (holotype cited first) TL c. 8.16, 7.51-8.72; HL 2.03, 1.84-2.15; HW 1.62, 1.47-1.68; CI 80, 78-81; SL 2.59, 2.34-2.73; SI 160, 155-162; PW 1.43, 1.31-1.56; MW 0.94, 0.84-1.03; PMI 152, 140-167; MTL 2.87, 2.59-3.06 (19 measured).

Anterior clypeal margin with obtusely denticulate median flange. Clypeus with median carina, sinuate in profile, with moderately impressed basal margin. Frontal furrow poorly indicated. Frontal carinae sinuate with weakly raised margins; central area with rather flat frontal furrow. Sides of head in front of eyes almost straight towards mandibular bases; behind eyes, sides rounding into convex occipital margin. Eyes moderately convex, in full face view reaching or marginally exceeding lateral cephalic outline. Ocelli lacking.

Pronotal humeri rounded with raised lateral margins, dorsally shallowly concave; pronotal dorsum with lateral margins behind humeri emarginate or notched, weakly converging towards promesonotal suture. Lateral margins of mesonotum converging posteriorly and weakly raised towards medially flat metanotal groove. Propodeal dorsum with margins terminating in slender, horizontal, subparallel, acute spines. Anterior face of petiole in side view rounding dorsally into long, slender, elevated, weakly divergent spines with tips curved upwards. Anterior face of first gastral tergite widely rounding onto dosum.

Mandibles densely and closely longitudinally striate with numerous piliferous pits. Head, mesosoma and petiole very finely reticulate-punctate. Tips of spines smooth and polished. Gaster shagreened.

Mandibles at masticatory and outer borders with numerous, curved, golden hairs. Anterior clypeal margin with a few, anteriorly directed setae and several short setae fringing margin laterally. Numerous relatively short, erect, golden hairs on dorsum of head, mesosoma and petiole, with several hairs on coxae and venter of femora. Gaster with numerous, erect, posteriorly inclined hairs dorsally; somewhat longer hairs around apex and on venter of gaster. Closely appressed, somewhat medially radiating, golden pubescence with somewhat reddish hue, rather abundant on dorsum of head and mesosoma, completely hiding underlying sculpturation; pubescence distinctly more pale golden or silvery along lateral margins and sides of mesosoma, on propodeal dorsum, bases of spines and gaster. Dorsum of gaster with very fine, closely appressed, golden pubescence and distinct, reddish, laterally diffused, median patch; pubescence more silvery on sides and venter of gaster.

Black, with mandibular teeth very dark reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis elegantula* is somewhat similar to several *Hagiomyrma* species, but not

to any of them in particular. It is characterised by its exceptionally tidy appearance, rather slender body and the lightly diffused reddish patch on the gastral dorsum. It is a relatively common species throughout lowland open eucalypt forests, *Melaleuca* dominated coastal plains and savannah woodlands. Its distribution extends from Cape York (Somerset, Bamaga), south to about Ingham. *Polyrhachis elegantula* was listed earlier by Kohout (2000: 199) as 'Hagio 10'.

*Polyrhachis (Hagiomyrma) feehani* sp. nov.  
(Fig. 4A-B)

**Etymology.** Named in honor of the collector of the type series specimens, J. Feehan of the ANIC, CSIRO Ecosystem Sciences, Canberra.

**Material.** HOLOTYPE: QLD, Cape York Pen., 14 km WbyN of Hope Vale Mission, 15°16'S, 144°59'E, 7-10.v.1981, J.E. Feehan (worker). PARATYPES: data as for holotype (36 paratype workers). Type deposition: Holotype and most paratypes in ANIC; 2 paratypes each in BMNH, MCZC and QM.

**Other Material.** QLD: Shipton's Flat, S of Cooktown, vi.1958 (P.J. Darlington) (w); Cooktown (E.A.G. Clive) (w).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 11.24, 10.78-11.79; HL 2.65, 2.56-2.74; HW 2.06, 1.96-2.12; CI 78, 73-80; SL 3.53, 3.33-3.68; SI 171, 164-176; PW 1.75, 1.71-1.90; MW1.28, 1.21-1.31; PMI 137, 137-154; MTL 4.18, 4.03-4.43 (13 measured).

Anterior clypeal margin with shallow, emarginate, obtusely denticulate, median flange. Clypeus with median carina, weakly sinuate in profile, posteriorly rounding into shallow basal margin. Frontal carinae sinuate with distinctly raised margins. Sides of head in front of eyes almost straight towards mandibular bases; behind eyes, sides rounding into convex occipital margin. Eyes moderately convex, in full face view only reaching, or marginally exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with humeri rounded; lateral margins notched and weakly divergent towards promesonotal suture. Mesonotum with lateral margins converging towards poorly indicated metanotal groove. Propodeal dorsum armed with rather strong,



weakly divergent spines, with tips curved upwards and outwards. Petiole armed with pair of weakly divergent, acute spines. Anterior face of first gastral tergite widely rounding onto dorsum. First gastral tergite somewhat transverse with sides produced into blunt prominences, somewhat similar to, but less distinct than those in *P. vernoni* described below.

Mandibles closely longitudinally striate with numerous piliferous pits. Head, mesosoma and petiole distinctly reticulate-punctate, with sculpturation between eyes and frontal carinae organised into fine, longitudinal striae, converging anteriorly and obliquely on clypeus and meeting along median carina. Mesosomal dorsum with reticulae somewhat organised more regularly into striate rugulations, anteriorly directed along promesonotal suture, bowed and forming more-or-less incomplete semicircles on mesonotal and propodeal dorsa. Gaster shagreened.

Mandibles at masticatory borders and towards bases with numerous golden hairs. Anterior clypeal margin with several, anteriorly projecting setae medially and fringe of short setae laterally. Clypeus and sides of head with very short, appressed, silvery hairs arising from numerous shallow pits. Medium length, anteriorly inclined, silvery hairs between frontal carinae, increasing in density on vertex. Dorsa of mesosoma and petiole with rather dense cover of mostly erect or variously curved, long hairs, most longer than greatest diameter of eyes. Gaster with long, posteriorly directed hairs, silvery on venter and sides, golden on dorsum. Somewhat untidy, silvery, appressed pubescence in various densities over most body surfaces. Dorsum of gaster with distinctly longer, golden, appressed pubescence and very distinct, dark reddish-brown, laterally diffused, median patch; pubescence more silvery on sides and venter of gaster.

Black; mandibles black with narrow, reddish-brown band along masticatory border; teeth black. Appendages and venter of gaster reddish-brown.

Sexuals unknown. Immature stages present in the ANIC collection.

**Remarks.** *Polyrhachis feehani* is superficially similar to several species, including *P. brisbanensis*, *P. brutella*, *P. burwelli*, *P. darlingtoni* and *P. dougcooki*, which are all large and have a very obvious, reddish-golden, median patch on the gastral dorsum. It differs from most of them by its weakly anteriorly converging pronotal margins, a character shared only with *P. darlingtoni*. Both species are easily distinguished by the shape of their petioles (see Figs 4A-B and 13A-B). *Polyrhachis feehani* appears to be rather rare and has been collected only on a few occasions. Its distribution is apparently limited to the wider Cooktown area.

*Polyrhachis* (*Hagiomyrma*) *semiaurata*  
Mayr, 1876  
(Fig. 4C-D)

*Polyrhachis semiaurata* Mayr, 1876:71. Syntype workers.  
Type locality: NSW, Sydney, NHMW (examined).

*Polyrhachis* (*Hagiomyrma*) *semiaurata* Mayr. Forel, 1915:108  
(combination in *P. (Hagiomyrma)*).

**Other Material.** QLD: Expedition Ra., Blackdown Tblld, 23°48'S, 149°04'E, 1-6.ii.1981 (GBM) (w); ditto, 4-6.iv.1981 (RJK accs 81.9, 32) (w); Mt Moffat NP, Kenniffs Lookout, 13.xii.1987 (J. Gallon) (w); ditto, 13.xii.1987 (GBM, GT & DKY) (w); Marlong Arch, 23.ix.1986 (GBM, GT & DKY) (w); Consuelo Tblld, 1000 m, 20-27.ix.1986 (GBM, GT & DKY) (w); Beerwah, 10.xi.1981 (M.J. Hockey) (w); Toorbul, ENE of Caboolture, 27.x.1981 (M.J. Hockey) (w); 9 km E of Caboolture, 27°05'S, 153°02'E, 19.x.1974 (RJK acc. 74.115) (w); Crows Nest MP, Perseverance sec., 27°18'53"S, 152°6'51"E, 4.xii.2003 (CJB, S. Wright, O. Seeman) (w); Hampton-Esk Rd, 27°19'S, 152°16'E, 15.ii.1975 (RJK acc. 75.85) (w); Perseverance Ck For. Res., 27°21'8"S, 152°6'5"E, 4.xii.2003 (CJB, S. Wright, O. Seeman) (w); Mt Nebo Rd, 27°26'S, 152°54'E, 21.ix.1974 (RJK acc. 74.105) (w); ditto, 15.xii.1974 (RJK acc. 74.160) (w); Brisbane, Mt Coot-tha, 14.i.1961 (BBL) (w); ditto, iv-v.1962 (RWT acc. 663) (w); Chelsea Rd Bushland Res., 27°28'58"S, 153°11'15"E, 10.xi.2003 (QM Party) (w); Rafting Ground Res., 27°31'17"S, 152°55'30"E, 13-17.viii.2003 (CJB) (w); Redlands, Hilliards Ck, nr Weippin Rd, 27°32'6"S, 153°14'54"E, 19.i.2009 (QM Party) (w); Enterprise Mine, 27°33'37"S, 153°27'6"E, 9.i.2002 (QM Party) (w); Illaweena St, Drewvale, 27°38'39"S, 153°3'47"E, 9.ix.2003 (QM Party) (w); 0.8km SE of Spring Mtn, 27°43'36"S, 152°52'58"E, 19.iii.2005 (QM Party) (w); Darlington Ra., Thunderbird Park, 27°54'S, 153°11'E, 15.ii.1976 (RJK acc. 76.4) (w); Mt French, lookout area, 27°59'9"S, 152°37'11"E, 13.viii.2003 (CJB) (w);

Lamington NP, Binna Burra, 28°13'S, 153°11'E, c. 850 m, 30.xii.1973 (RJK acc. 73.244) (♀); Stanthorpe, 13.xi.1985 (DKY) (w); Girraween NP, 28°50'S, 151°55'E, 9-10.i.1982 (RJK acc. 82.1) (w). NSW: Barraba-Bundarra Rd, 30°17'S, 150°47'E, 18.xi-9.xii.2001 (L. Wilkie & H. Smith) (w); Eastwood SF, nr Armidale, 30°24'S, 151°43'E, 1981-82 (Y. Sakurai) (♀); 'Warrane', nr Armidale, iv.1980 (K. Jackques) (w); Coffs Harbour distr., Pine Ck SF, 25.vi.1967 (RWT) (w); Olney SF, 33°08'S, 151°24'E, 30.vi.1990 (T. Gush) (w); Castlereagh SF, 33°40'S, 150°45'E, 6.vii.1991 (T. Gush) (w); Tamworth, 800 m, 29.iv.1987 (BBL) (w); Galston Gorge, 25 km NNW of Sydney, 33°40'S, 151°05'E, 22.i.1982 (RJK acc. 82.42) (w); Kurragong, 20.iv.1975 (K. Stante) (w); Brisbane Water NP, Girracool, 16.xii.1977 (BBL) (w); Killarney Gap, Narrabri, iii.1978 (PMR) (w); Woy Woy, 15.viii.1976 (BBL) (w); Kioloa, ANU Field Stn, 35°32'S, 150°23'E, 50 m, 12.viii.1990 (S.O. Shattuck #1683) (w); Narrabri, Gravel Pit Ck, Kaputar, 1.xi.1975 (P. Room) (w); Urbenville (J. Armstrong) (w). VIC: Glenaladale NP, Bull Ck, 3 iii 1983 (ANA) (w).

**Description.** *Worker.* Dimensions (syntypes cited first): TL c. 9.47-9.63, 9.02-10.38; HL 2.34-2.40, 2.21-2.43; HW 1.84-1.93, 1.72-1.96; CI 79-80, 78-84; SL 2.81-2.87, 2.62-2.92; SI 149-153, 144-153; PW 1.61-1.65, 1.50-1.65; MW 1.13-1.18, 1.13-1.25; PMI 140-142, 131-142; MTL 3.63-3.68, 3.38-3.68 (2+16 measured).

Anterior clypeal margin with obtusely denticulate, median flange, laterally flanked by blunt angles. Clypeus with median carina, straight or very weakly sinuate in profile, rounding posteriorly into well impressed basal margin. Frontal carinae with moderately raised margins. Sides of head in front of eyes converging towards mandibular bases in almost straight line; behind eyes, sides rounding into convex occipital margin. Eyes convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with humeri rounded; lateral margins emarginate or notched at about midlength, widely rounding into well impressed promesonotal suture. Mesonotal dorsum with lateral margins weakly raised towards medially flat, metanotal groove. Propodeal dorsum armed with horizontal, divergent spines, distinctly curved outwards from midlength. Petiole in lateral view with anterior face rounded into elevated, sinuate spines, with tips curved upwards; dorsum concave medially, spines only weakly

divergent in dorsal view. Anterior face of first gastral tergite widely rounding onto dorsum.

Mandibles finely, irregularly, striate-rugose with piliferous pits. Head, mesosoma and gaster reticulate-punctate; basal half of propodeal spines sculptured, smooth and polished towards tips; petiolar spines smooth and polished along full length. Gaster finely shagreened, smooth and rather polished.

Mandibular masticatory and outer borders with curved, golden hairs. Anterior clypeal margin with a few longer, golden setae medially and fringe of shorter setae laterally. Head, mesosoma, petiole and gaster with abundant, golden, erect and/or variously curved, hairs, distinctly longer than greatest diameter of eyes, except: clypeus with only a few paired, long hairs along anterior and basal borders; leading edge of antennal scapes with fringe of short, semierect, bristle-like hairs; head in full face view with a few shorter hairs between occipital corners and mandibular bases; hairs on gaster more posteriorly inclined. Abundant, rather long, rich golden, appressed pubescence on most body surfaces, except clypeus, appendages and gaster; pubescence denser and distinctly medially radiating on dorsum of mesosoma, completely hiding underlying sculpturation. Very diluted, pale golden or silvery pubescence on gaster, lacking in some specimens.

Black throughout, only mandibles reddish-brown.

*Queen.* Dimensions: TL c. 9.17-9.42; HL 1.96-2.06; HW 1.59-1.65; CI 80-81; SL 2.42-2.50; SI 151-153; PW 1.86-1.96; MTL 2.96-3.06 (3 measured).

Apart from sexual characters and generally smaller size (HL 1.96-2.06 in queen, versus 2.21-2.43 in worker), very similar to worker, except: mesoscutum with dorsum flat, as wide as long; median line bifurcate; parapsides flat, only marginally raised posteriorly. Mesoscutellum very weakly convex, not elevated above dorsal plane of mesosoma. Propodeal spines very slender, divergent; petiolar spines similar to those in worker, but shorter. Pilosity generally



much shorter and less dense on head and dorsum of mesosoma, head in full face view without fringing hairs between eyes and mandibular bases. Pubescence similar to worker, except for dorsum of mesoscutum where it is rather diluted, with only a patch of closely appressed hairs along midline. Sculpturation and colour virtually identical to worker.

Males and immature stages present in the QM collection.

**Remarks.** With its rich golden pubescence on the head and mesosoma, combined with a black, polished and virtually pubescence free gaster, *Polyrhachis semiaurata* is one of the most easily recognisable species. It ranges from Blackdown Tableland in central Queensland, south to northern Victoria and as far west as Carnarvon National Park in central Queensland. In its nesting habits, *P. semiaurata* is both lignicolous and terrestrial, with some colonies found nesting in the partly burned trunks of felled trees.

*Polyrhachis* (*Hagiomyrma*) *uncaria* sp. nov.  
(Fig. 4E-F)

**Etymology.** Formed by the latinization of a modern word, *uncared-for*, meaning neglected.

**Material.** HOLOTYPE: QLD, Expedition Ra., Blackdown Tbl, 23°48'S, 149°04'E, 1-6.ii.1981, G.B. Monteith, QM T174507 (worker). PARATYPES: data as for holotype (5 workers); Mt Moffat NP, 25.ix.1995, G.B. Monteith (2 workers). Type distribution: Holotype and 1 paratype in QM; 2 paratypes each in ANIC, BMNH and MCZC.

**Other Material.** QLD: Windsor Tbl, 28 km NNW of Mt Carbine, 15-18.iv.1982 (GBM, DKY & DLC) (w); Taroom Distr., Cabbage Tree Ck, Nathan Gorge, 25°27'0"S, 150°10'0"E, 20.vi.1996 (H. Janetzki) (w); ditto, Nathan Gorge Camp, 25°27'0"S, 150°8'0"E, 14.xi.1996 (QM Survey) (w).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 8.82, 8.12-8.82; HL 2.15, 2.02-2.24; HW 1.90, 1.76-1.97; CI 88, 84-88; SL 2.78, 2.52-2.78; SI 146, 141-147; PW 1.68, 1.56-1.76; MW 1.12, 1.01-1.15; PMI 151, 141-158; MTL 3.22, 3.02-3.38 (6 measured).

Anterior clypeal margin with denticulate, medially notched, median flange, laterally

flanked by obtuse angles. Clypeus with weakly raised median carina; in profile virtually straight with only very shallow depression anteriorly; basal margin very weakly impressed. Frontal triangle indistinct. Frontal carinae sinuate with moderately raised margins; central area rather flat with shallowly impressed frontal furrow. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes, sides rounding into rather low, weakly convex, occipital margin. Eyes convex, in full face view not or only marginally exceeding lateral cephalic outline. Ocelli lacking; relative position of posterior pair indicated by sculptural tubercle in most specimens. Pronotal humeri rounded with raised margins; pronotal lateral margins weakly emarginate or notched at about midlength. Promesonotal suture distinctly impressed. Mesonotum with margins converging towards weakly impressed, medially flat, metanotal groove. Propodeal margins terminating in weakly divergent, somewhat downwards and outwards directed spines. Anterior face of petiole in lateral view rounding dorsally into downward curved spines with distinctly upturned tips. Petiolar spines in dorsal view subparallel with tips curved outwards; posterior face of petiole distinctly convex towards base.

Mandibles very finely, longitudinally striate with numerous piliferous pits. Head, mesosoma and petiole finely and closely reticulate-punctate, sculpture on vertex somewhat more longitudinally directed. Spines sculptured at bases, smooth and polished towards tips. Gaster finely shagreened.

Mandibles at masticatory borders with numerous, golden, curved hairs. Anterior clypeal margin with a few, anteriorly projecting longer setae medially and several shorter setae fringing margin laterally. Clypeus, central area and vertex with numerous, medium length, erect and anteriorly directed, golden hairs. Dorsum of mesosoma with numerous, erect or variously curved, golden hairs, some almost as long as greatest diameter of eyes. Several hairs on dorsum of petiole, anterior face of fore coxae and venter of middle and hind coxae and femora. Gaster with

abundant, posteriorly directed, golden hairs on dorsum; hairs marginally longer on apex and venter. Closely appressed, medium length pubescence, in various densities over most body surfaces; pubescence silvery on front and sides of head, sides of mesosoma, coxae and petiole, more golden on vertex of head and dorsum of mesosoma where it is medially radiating. Dorsum of gaster with very distinct, reddish-golden pubescence completely hiding underlying sculpturation; pubescence somewhat laterally diffused to more silvery on gastral sides and venter.

Black; mandibles dark reddish-brown towards masticatory borders.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis uncaria* is very similar to *P. ammon* but they can be separated by the following characters: clypeus in *P. uncaria* with median carina only weakly raised; clypeus virtually straight in profile, with only a very shallow depression behind anterior margin, terminating posteriorly in an almost flat basal margin; propodeal spines in lateral view directed downwards, following the curved outline of the mesosomal dorsum; petiole with spines subparallel; anterior face of petiole in lateral view rounding dorsally into rather strongly downwardly curved spines; posterior face of petiole distinctly swollen towards base; pubescence on dorsum of head virtually the same density as that on dorsum of mesosoma; very distinct, reddish-golden pubescence covering most of the dorsum of the gaster. In contrast, the clypeus in *P. ammon* has a distinctly raised median carina and is strongly sinuate in profile with a distinctly impressed basal margin, the propodeal spines are horizontal and aligned with the main axis of the body in lateral view, the anterior face of the petiole is straight and its posterior face is obliquely descending, the petiolar spines are distinctly divergent and horizontal in side view, pubescence is virtually lacking from the dorsum of head which is distinctly black in appearance and strongly contrasts with the pubescent dorsum of the mesosoma, and the reddish-golden patch of appressed gastral

pubescence is limited to a median dorsal strip that extends posteriorly from the base of first gastral tergite but does not reach the apex of the gaster.

*Polyrhachis uncaria* appears a rather rare species known only from a few localities in central Queensland, with an apparently isolated population on Windsor Tableland, just north-west of Mossman. However, since the species is rare, the apparent gaps in its distribution may be reduced through additional surveys. It inhabits open forests and often occurs together with *P. ammon*. The nesting habit of *P. uncaria* is unknown, but it probably nests in the ground like most other *Hagiomyrma* species.

*Polyrhachis (Hagiomyrma) vernoni* sp. nov.  
(Fig. 4G-H)

**Etymology.** Named in honour of the collector of the holotype, Donald P. Vernon, formerly of the Queensland Museum, Brisbane, who was the only Australian member of the 1948 Archbold Expedition to Cape York.

**Material.** HOLOTYPE: QLD, Cape York Pen., Mt Tozer, 12°45'S, 143°13'E, 24.vi.1948, D.P. Vernon, QM T174508 (worker). PARATYPES: data as for holotype (1 worker); Mt Tozer, summit, 12°45'S, 143°13'E, 545 m, 8.xii.1985, G.B. Monteith & D.L. Cook (10 workers). Type deposition: Holotype and 2 paratypes in QM; 2 paratypes each in ANIC, BMNH, MCZC, 1 paratype in MHNG.

**Other Material.** QLD: West Claudie R., 12°44'S, 143°14'E, 500 m, rf., 3-10.xii.1985 (GBM & DJC) (w).

**Description.** *Worker*: Dimensions (holotype cited first): TL c. 11.04, 11.04-11.74; HL 2.56, 2.56-2.78; HW 1.84, 1.84-2.00; CI 72, 70-73; SL 3.17, 3.17-3.48; SI 172, 167-178; PW 1.68, 1.68-1.84; MW 1.12, 1.12-1.22; PMI 150, 146-160; MTL 3.88, 3.88-4.28 (12 measured).

Anterior clypeal margin with shallow, obtusely denticulate, median flange, laterally flanked by blunt angles. Clypeus with median carina; sinuate in profile, posteriorly rounding into well impressed basal margin. Frontal triangle indistinct. Frontal carinae sinuate with distinctly raised margins; central area relatively wide with distinct median carina. Sides of head in front of eyes converging towards mandibular bases in straight line; behind eyes, sides



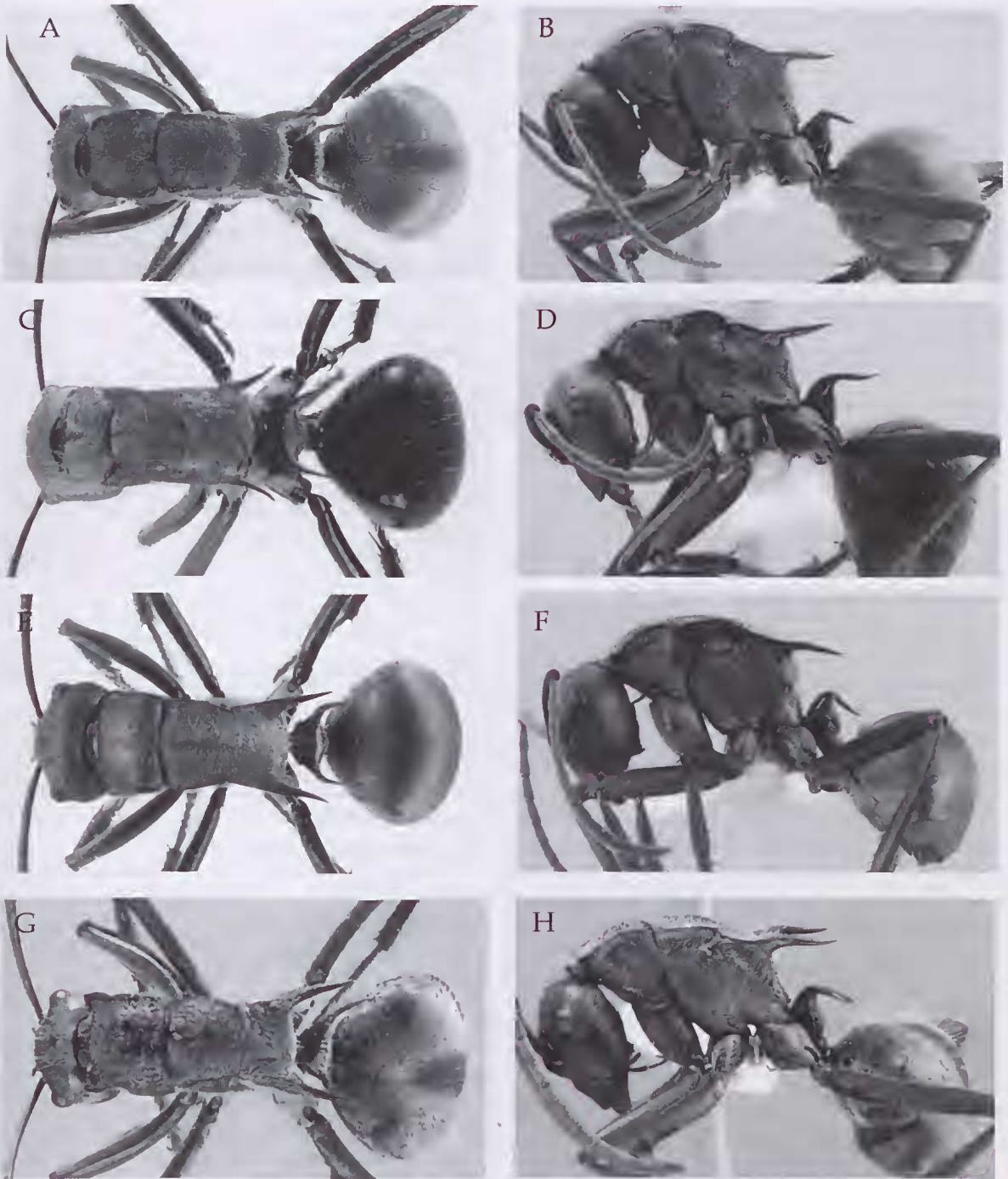


FIG. 4. *Polyrhachis* (*Hagiomyrma*) *ammon* species-group – dorsal (left) and lateral (right) view. A-B, *P. feehani* sp. nov.; C-D, *P. semiaurata* Mayr; E-F, *P. (H.) uncaria* sp. nov.; G-H, *P. vernoni* sp. nov. (not to scale).

rounding into highly convex occipital margin. Eyes convex, in full face view exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri produced into dilated, angular prominences with distinctly raised margins; lateral margins behind humeri weakly raised, subparallel towards well impressed promesonotal suture. Mesonotal lateral margins weakly raised for most of length; posteriorly converging towards indistinct metanotal groove. Propodeal margins terminating in rather strong, divergent spines, obliquely raised from bases in side view and sinuate towards weakly upturned tips. Petiole with dorsum shallowly concave medially, armed with divergent, horizontal spines. First gastral tergite distinctly transverse, in dorsal view with sides produced into somewhat bluntly elevated, shoulder-like prominences.

Mandibles finely, longitudinally striate with numerous piliferous pits. Head, mesosoma and petiole reticulate-punctate; spines sculptured at bases, smooth and polished towards tips. Gaster shagreened.

Mandibular masticatory borders with numerous, curved, golden hairs and short, appressed hairs towards bases. Anterior clypeal margin with a few longer, anteriorly projecting setae medially and numerous, short setae, fringing margin laterally. Clypeus with only a few, paired, rather short, semierect hairs; central area and vertex with numerous, medium length, anteriorly directed, golden hairs, but no hairs breaking lateral cephalic outline between eyes and mandibular bases in full face view. Leading edges of antennal scapes with a few, semierect, short, bristle-like hairs. Dorsum of mesosoma, gaster and anterior face of fore coxae, with numerous, erect or variously curved, golden hairs, some as long as greatest diameter of eyes; somewhat shorter hairs on dorsum of petiole, mid and hind coxae and venter of femora; hairs more diluted and anteriorly directed on venter of gaster. Relatively long, appressed, somewhat untidy, golden pubescence on dorsum of head, mesosoma and petiole; pubescence distinctly shorter and much diluted on clypeus and sides of head and mesosoma. Dorsum of gaster with abundant, golden pubescence and very

distinct, dark, reddish-brown median patch, extending posteriorly along first and second tergite; pubescence more diluted and silvery on gastral venter.

Black; mandibular masticatory borders, appendages and venter of gaster medium to dark reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis vernoni* is a very distinct species, easily separated from all other *Hagiomyrma* by the unique, distinctly raised, angular margins of pronotal humeri and the strongly transverse first gastral tergite with blunt lateral prominences. It is one of only a few rainforest dwelling members of the subgenus, with most specimens known collected foraging on the ground and large boulders at the summit and slopes of Mt Tozer in Iron Range National Park.

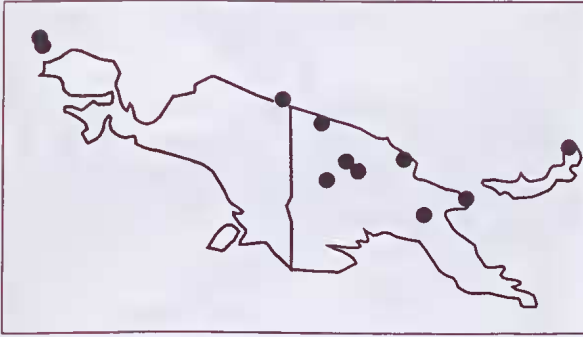
#### POLYRHACHIS (HAGIOMYRMA) METELLA SPECIES-GROUP

##### *Polyrhachis (Hagiomyrma) metella* Fr. Smith, 1860 (Fig. 5A-B)

*Polyrhachis metella* Fr. Smith, 1860: 99, pl. 1, figs 20, 29. Holotype worker. Type locality: NEW GUINEA, Dory (= INDONESIA, IRIAN JAYA, Manokvari) (A.R. Wallace), OXUM (examined).

**Other Material.** INDONESIA: Waigeu (= Pulau Waigeo), Camp Nok, 2500', v.1938 (L.E. Cheesman, BM 1938-593) (w). IRIAN JAYA (as Dutch New Guinea): Lordberg (Mt Burgers), c. 5°N, 143°S (Kais, Augustall Exp.) (w); above Ikar, 500-750 m, 23.vi.1959 (J.L. Gressitt) (w). NEW GUINEA: (no further data) (P. Hossfeld) (w). BISMARCK ARCHIPELAGO, NEW BRITAIN, Baining Mts (G.F. Hill) (♀). PAPUA NEW GUINEA: Western Prov., Muller Ra., 45 km SW of Kapiago, -5.72914, 142.2633, 495 m, rf., 4.& 9.ix.2010 (A. Lucky) (w); West Sepik Prov. (Kais, Wilhelmsland), Torricelli Mts, (Dr Schlaginhaufen) (w); (D. Neuguinea) Wareo (w); Adelbert Mts, Wanuma, 800-1000 m, 25-26.x.1958 (J.L. Gressitt) (w); Tsanga, Upper Jimmi Valley, 840 m, 13.vii.1958 (J.L. Gressitt) (w); Wum, Upper Jimmi Valley, 840 m, 17.vii.1955 (J.L. Gressitt) (w); Upper Jimmi V., 15.vii.1955 (J.L. Gressitt) (w); Finschhafen (as Finsch Haven) (L. Wagner) (w); Gulf Prov.: Ivinka Camp, Lakekamu basin (07°7'S, 146°8'E), 120 m, 4.xii.1996, lowland wet forest (R.R. Snelling #96.405) (w).





*POLYRHACHIS (HAGIOMYRMA) METELLA*  
SPECIES-GROUP

Map 1 ● *P. metella*

**Description.** *Worker:* Dimensions (holotype cited first): TL c. 10.13, 9.42-11.14; HL 2.52, 2.28-2.65; HW 1.74, 1.59-1.93; CI 69, 69-74; SL 3.43, 3.17-3.73; SI 197, 189-204; PW (greatest width measured along promesonotal suture) 1.36, 1.31-1.55; MTL 4.18, 3.93-4.43 (12 measured).

Mandibles with 5 teeth. Anterior clypeal margin with open 'U'-shaped emargination, laterally flanked by distinct, strong teeth; clypeus with rather blunt median carina, virtually straight in profile; basal margin shallow. Frontal triangle indistinct. Frontal carinae weakly sinuate, very strongly raised, almost vertical; central area very narrow, deeply excavated, with poorly indicated frontal furrow. Sides of head in front of eyes subparallel, straight or very weakly convex towards mandibular bases; behind eyes, sides merging into distinct, postocular ridges running on each side from narrow occipital margin along occipital corners, terminating before reaching posterior margin of eyes. Eyes relatively small, moderately convex, in full face view not reaching lateral cephalic outline. Median ocellus present in some specimens; lateral ocelli lacking. Pronotal dorsum with lateral margins strongly converging anteriorly; pronotal humeri with high, almost vertically raised, somewhat angular margins; promesonotal suture deeply impressed laterally. Mesonotal dorsum disc-shaped in dorsal view, lateral margins raised posteriorly; metanotal groove distinctly impressed. Propodeal lateral margins strongly raised for short distance before terminating in long, subparallel or divergent, somewhat sinuate

spines, apical third of spines usually weakly curved outwards; propodeal dorsum between somewhat flattened, bases of spines rather short and narrow, abruptly rounding into high, obliquely descending, weakly convex, declivity. Hind coxae dorsoposteriorly carinate with dorsally projecting blunt processes. Petiole with anterior and posterior faces subparallel, or distinctly concave in some specimens; dorsum with posteriorly sloping platform, laterally armed with long, slender, divergent spines with tips weakly curved outwards. Anterior face of first gastral tergite only marginally higher than full height of petiole, widely rounding onto dorsum.

Mandibles densely longitudinally striate at bases, smooth and polished towards masticatory borders with numerous piliferous pits. Head and mesosoma closely reticulate-punctate. Spines sculptured at bases, smooth and polished towards tips. Petiole with anterior face smooth and polished, posterior face finely reticulate. Gaster finely shagreened.

Mandibles at masticatory borders with numerous, rather short, curved, golden hairs. Anterior clypeal margin medially with a few, rather long, anteriorly projecting setae and fringe of shorter setae laterally. Clypeus with a few paired, medium length, golden hairs. A few erect hairs on venter of coxae, fringe of hairs on venter of fore and mid femora. Apex and venter of gaster with numerous posteriorly directed hairs, longest hairs almost reaching greatest diameter of eyes in length. Hairs completely lacking from sides and vertex of head, mesosoma, petiole and most of gastral dorsum. Closely appressed, relatively long, silvery pubescence on sides of head, mesosoma, petiole and venter of gaster; pubescence distinctly golden on vertex of head and dorsum of mesosoma where it is somewhat medially radiating. Dorsum of gaster with rather abundant, medially radiating, golden pubescence, virtually identical to that in members of the *Polyrhachis sexspinosa*-group of subgenus *Myrmihopla*.

Black; mandibular masticatory borders, appendages, excluding coxae, and gaster medium

reddish-brown. Antennal scapes towards bases and tarsi a shade darker.

*Queen.* Dimensions: TL c. 11.19; HL 2.56; HW 1.84; CI 72; SL 3.53; SI 192; PW 2.00; MTL 4.28 (1 measured).

Apart from sexual characters similar to worker, except: eyes more convex, clearly exceeding lateral cephalic outline. Mesoscutum wider than long with lateral margins converging into narrowly rounded anterior margin; dorsum relatively low, weakly convex in lateral view; median line distinct; parapsides flat. Mesoscutellum only marginally elevated above dorsal plane of mesosoma. Propodeal spines horizontal, relatively short, about as long as distance between bases. Petiole similar to that in worker with spines divergent and distinctly shorter. Sculpturation, pilosity, pubescence and colour identical to those in worker.

Male and immature stages unknown.

**Remarks.** *Polyrhachis metella* is a very unusual species that combines several unrelated characters, such as the deeply medially emarginate anterior clypeal margin, rather peculiar, disc-shaped mesonotal dorsum, extremely long and slender propodeal spines and appendages, very high declivity and flat topped petiole. Such a combination of characters suggests that *P. metella* may be allied with species in the subgenus *Hedomyrma*. However, when Viehmeier (1912) redescribed the worker of *P. metella*, he considered its unarmed pronotal shoulders a sufficient character to place it in the *ammon*-group. His decision was followed by Emery (1925) and all subsequent authors have included *P. metella* in the subgenus *Hagiomyrma*.

*Polyrhachis metella* is one of only two *Hagiomyrma* species that does not occur on the Australian mainland (the other is *P. denticulata* Karavaiev). It is evidently a rare species, manifestly missing from most recent collections.

## POLYRHACHIS (HAGIOMYRMA) PENELOPE SPECIES-GROUP

### *Polyrhachis (Hagiomyrma) anderseni* sp. nov. (Fig. 6A-B)

**Etymology.** Named in honor of Dr Alan N. Andersen of the CSIRO, TERC in Darwin, who has discovered many new species of *Polyrhachis* and other ants throughout the monsoonal and arid zones of the northern Australia.

**Material.** HOLOTYPE: WA, Kimberley region, Cape Bernier, 14°07'S, 127°31'E, vi.1988, A.N. Andersen, (worker). PARATYPES: data as for holotype (5 workers); Mirima (Hidden Valley) NP, 15°45'S, 128°45'E, c. 54 m, 10-11.vi.2008, ex nest in rock crevice, R.J. Kohout & S.K.A. Robson acc. 2008.5 (51 workers). Type deposition: Holotype and 2 paratypes in ANIC; most paratypes in QM, 2 paratypes each in BMNH, CURT, MCZC, MHNG, TERC and WAMP.

**Other Material.** WA: Kimberley region, CALM site 28/3, 15°38'S, 128°15'E, 16.vi.1988 (TAW) (w); Wyndham, 6.iv.2004 (ANA) (w); 10 km NE of Kununurra, 2.v.1989 (DKY) (w); Mirima (Hidden Valley) NP, 12.ix.1998 (ANA) (w); ditto, 10-11.vi.2008, ex nest in rock crevice (RJK & SKR acc. 2008.8) (w); Yampi 1 Stn, v.2002 (C. Palmer) (w); Glenelg R., 15°48'S, 124°44'E, vi.1988 (ANA) (w); Kununurra-Purnululu NP, 11.vi.2001 (A. Chapman) (w); Purnululu NP, Gorge, 2.ix.2004 (L. Barrow) (w); Osborne I. SW, vi.1988 (JDM) (w). NT: Keep R. NP, E of Kununurra (WA), 15.vii.1990 (R.P. McMillan) (w); Keep River NP, Gurrandalng, 15°52'S, 129°03'E, 12.vi.2008 (RJK & SKR accs 2008.12, 13) (w); Keep R. NP, Keep R. Escarpment, 15°51'S, 129°07'E, 9.v.1990 (S. Mann) (w); Cannon Hill, 6 km NNW of Cahills x-ing, 12°23'S, 132°57'E, 8.vi.1973 (JEF) (w); Podocarpus Canyon, Arnhem Land, 12°39'S, 133°27'E (H. Reichel) (w); 22 km WSW of Boroolua, 16°08'S, 136°06'E, 16.iv.1976 (JEF) (w); Gregory NP, Jasper Gorge, xi.1999 (K. Nash) (w); Alligator Ck/ Reynolds R. junct., 25.iv.1994 (BDH) (w).

**Description.** *Worker:* Dimensions (holotype cited first): TL c. 6.80, 5.90-6.80; HL 1.62, 1.43-1.62; HW 1.43, 1.23-1.43; CI 88, 86-92; SL 2.09, 1.87-2.12; SI 146, 138-153; PW 1.28, 1.09-1.31; MW 0.76, 0.70-0.81; PMI 168, 149-168; MTL 2.25, 2.00-2.28 (14 measured).

Anterior clypeal margin truncate medially without distinct median flange; truncate portion denticulate, laterally delimited by acute teeth. Clypeus with distinct median carina; weakly convex in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle indistinct. Frontal carinae with weakly





FIG. 5. *Polyrhachis* (*Hagiomyrma*) *metella* species-group – dorsal (left) and lateral (right) view. A-B, *P. metella* Fr. Smith (not to scale).

raised margins; central area relatively wide, flat. Sides of head in front of eyes converging towards mandibular bases in straight line; behind eyes, sides widely rounding into convex occipital margin. Eyes moderately convex, in full face view not or only marginally exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum distinctly wider than long, widest at about midlength; humeri widely rounded, with shallow depression dorsally along narrowly raised, posteriorly converging lateral margins. Mesonotal dorsum with lateral margins shallowly emarginate towards poorly indicated metanotal groove. Propodeal margins terminating posteriorly in relatively short, horizontal and subparallel, acute spines; spines about half as long as distance between tips. Anterior face of petiole rounding dorsally into upturned, subparallel, or weakly divergent, acute spines; bases of spines closely approximated, petiolar dorsum between them deeply concave, forming open 'U' when viewed from behind. Posterior face of petiole distinctly swollen towards base. Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles finely, longitudinally striate with numerous piliferous pits. Head, mesosoma, and petiole finely and uniformly reticulate-punctate. Gaster shagreened.

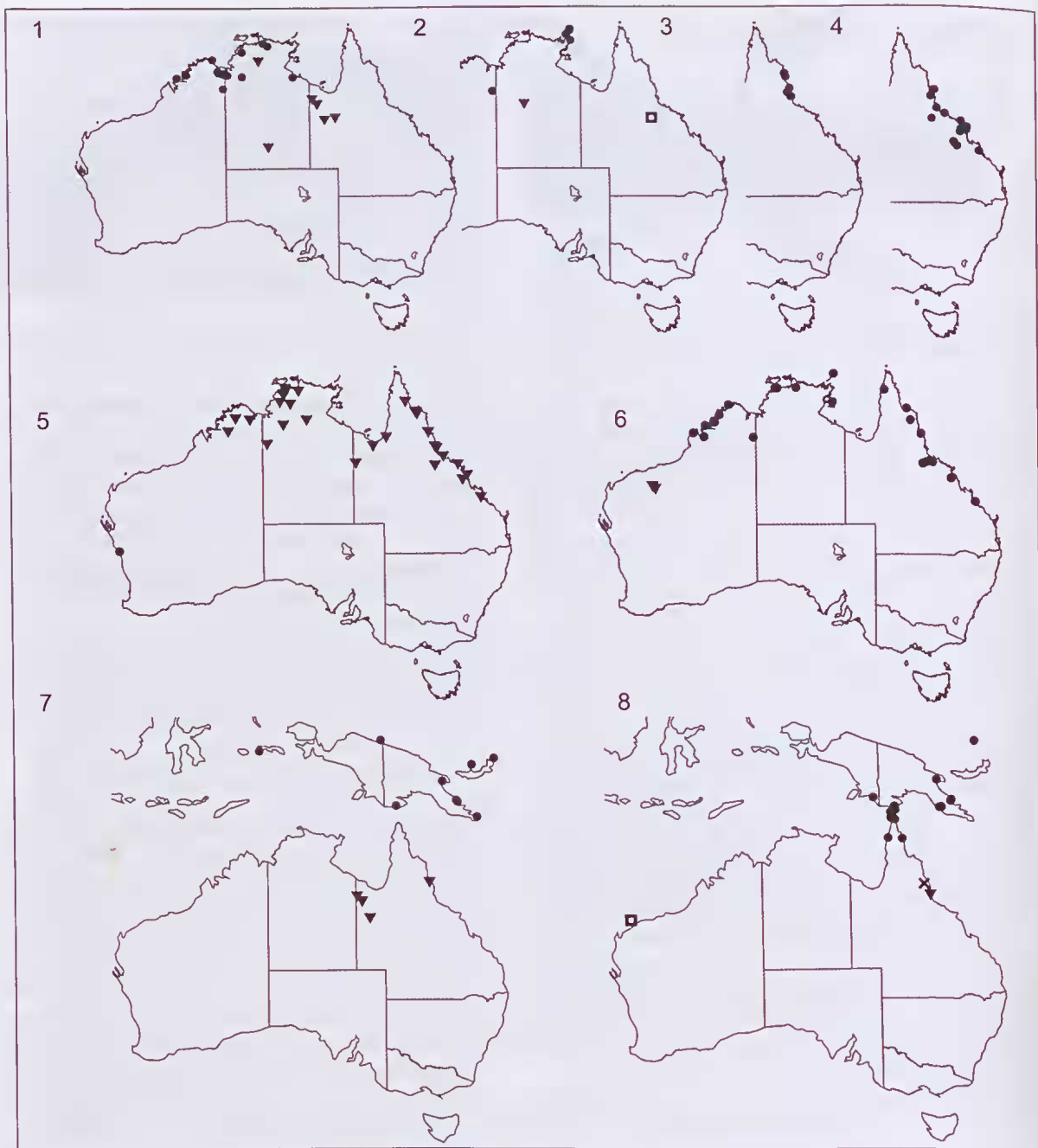
Mandibular masticatory and outer borders with curved golden hairs and closely appressed shorter hairs towards bases. Anterior clypeal margin medially with several, medium length

setae and a few short setae fringing margin laterally. Rather sporadic, relatively short, erect hairs on dorsum of head and body, hairs on gaster distinctly longer and more abundant. Silvery, appressed pubescence in various densities over most dorsal body surfaces; pubescence silvery or pale golden and more abundant on gastral dorsum, partly hiding underlying sculpturation.

Black, with mandibular teeth, condylae and apical funicular segments medium to dark reddish-brown. Legs, including coxae, dark to very dark reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis anderseni* is an easily recognisable species, featuring very closely approximated, upturned, petiolar spines. It somewhat resembles *P. archeri*, however, in that species the anterior clypeal margin is produced into a median denticulate flange, while it is simply medially truncate in *P. anderseni*. The bases of the petiolar spines in *P. archeri* are more distant and the propodeal spines in lateral view are directed downwards, forming a continuous line with the arching profile of the mesosomal dorsum (Fig. 6C-D). In contrast, the bases of petiolar spines in *P. anderseni* are closer and the propodeal spines are more horizontal. *Polyrhachis anderseni* is one of only a few lithocolous *Polyrhachis* species (the others are *P. thusnelda* Forel and *P. turneri* Forel) that build their nests inside rock crevices or on the sides of rock walls (Robson & Kohout 2005).



**POLYRHACHIS (HAGIOMYRMA) PENELOPE SPECIES GROUP**

Map 1 ● *P. anderseni* ▼ *P. archeri*

Map 2 ● *P. weiri* ▼ *P. tanami* □ *P. tenebra*

Map 3 ● *P. electra*

Map 4 ● *P. penelope*

Map 5 ● *P. clarki* ▼ *P. crawleyi*

Map 6 ● *P. melanura* ▼ *P. pilbara*

Map 7 ● *P. denticulata* (PNG) ▼ *P. hoffmanni*

Map 8 ● *P. semiobscura* ▼ *P. stricta*

□ *P. seducta* × *P. placida*



*Polyrhachis* (*Hagiomyrma*) *archeri* sp. nov.  
(Fig. 6C-D)

**Etymology.** Named in honour of Prof. Michael Archer, formerly of the Queensland Museum, whose name is closely associated with the famous palaeontological site at Riversleigh which is near the type locality of the species.

**Material.** HOLOTYPE: QLD, c. 6 km NW of Riversleigh Hmsd, 19°00'S, 138°41'E, 18-26.x.1977, R.J. Kohout acc. 77.27, QMT174509 (worker). PARATYPES: data as for holotype (4 workers); Gregory R., nr Riversleigh Hmsd, 19°01'S, 138°43'E, 23-24.x.1976, RJK acc. 76.71 (2 workers). Type deposition: Holotype and 1 paratype in QM, 1 paratype each in ANIC, BMNH, MCZC, MHNG and TERC.

**Other Material.** QLD: Lawn Hill Stn, 18°30'S, 138°10'E, ix.1991 (ANA, CRA Century Project) (w); Mt Isa, xii.1997 (T. Griffiths, CRC MIM Study) (w, ♀); Mt Fort Constantine, 20°29'8"S, 140°36'35"E, 7.iii.2004 (M. Sanders) (w). NT: Katherine Gorge escarpment, 14°19'S, 132°28'E, 25.xi.1993 (H. Reichel) (w); Standley Chasm, West MacDonnell Ranges, 23°44'S, 133°28'E, c. 750 m, 14.iii.2002 (CJB & C.M. Rodriguez acc. 51022) (w); ditto, 9.vi.2002 (RJK & SKR acc. 02.32).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 6.65, 6.55-6.96; HL 1.65, 1.62-1.72; HW 1.31, 1.28-1.34; CI 79, 78-81; SL 1.93, 1.93-2.00; SI 147, 145-153; PW 1.23, 1.22-1.28; MW 0.72, 0.72-0.84; PMI 171, 149-171; MTL 2.03, 2.03-2.15 (8 measured).

Anterior clypeal margin medially with acutely denticulate flange. Clypeus with distinct median carina; straight in profile, posteriorly rounding into weakly impressed basal margin. Frontal carinae with weakly raised margins; central area relatively wide, flat. Sides of head in front of eyes converging towards mandibular bases in straight line; behind eyes, sides widely rounding into convex occipital margin. Eyes weakly convex, marginally exceeding lateral cephalic outline in full face view. Ocelli lacking. Pronotal dorsum distinctly wider than long, widest at about midlength; humeri widely rounded, with shallow depression dorsally along narrowly raised margins. Lateral margins of pronotum and mesonotum converging posteriorly. Metanotal groove indistinct. Propodeal margins terminating posteriorly in relatively short, acute spines; length of spines

distinctly less than half distance between tips. Anterior face of petiole rounding dorsally into upturned, divergent, acute spines; bases of spines relatively close together, dorsum between them concave. Posterior face of petiole distinctly swollen. Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles finely, longitudinally striate with numerous piliferous pits. Head, mesosoma and petiole finely and uniformly reticulate-punctate, opaque. Gaster shagreened.

Mandibular masticatory and outer borders with curved golden hairs and closely appressed shorter hairs towards bases. Anterior clypeal margin medially with a few, medium length setae. Several short and medium length, erect hairs on clypeus, along frontal carinae and on vertex; distinctly shorter and more sparse hairs on dorsum of mesosoma; gaster dorsally with numerous short, posteriorly inclined, pale golden hairs, hairs on gastral venter distinctly longer and more abundant. Silvery, appressed pubescence in various densities over most dorsal body surfaces, except gastral dorsum with golden and more abundant pubescence, completely hiding underlying sculpturation.

Black; mandibles, clypeus, frontal area, antennae and legs, including coxae, medium to dark reddish-brown. Mandibular teeth and anterior clypeal margin bordered with black.

*Queen.* Dimensions: TL c. 7.91-8.32; HL 1.72-1.81; HW 1.37-1.40; CI 77-80; SL 1.87-1.93; SI 136-138; PW 1.62-1.68; MTL 1.96-2.15 (2 measured).

Apart from sexual characters very similar to worker except: mesoscutum wider than long with dorsum weakly convex in lateral view; median line distinct; parapsides flat. Mesoscutellum weakly convex, not elevated above dorsal plane of mesosoma. Propodeal spines very short, bases broad; petiolar spines shorter than in worker, distinctly obliquely elevated, divergent. Sculpturation, pilosity, pubescence and colour virtually identical to worker.

Male and immature stages unknown.

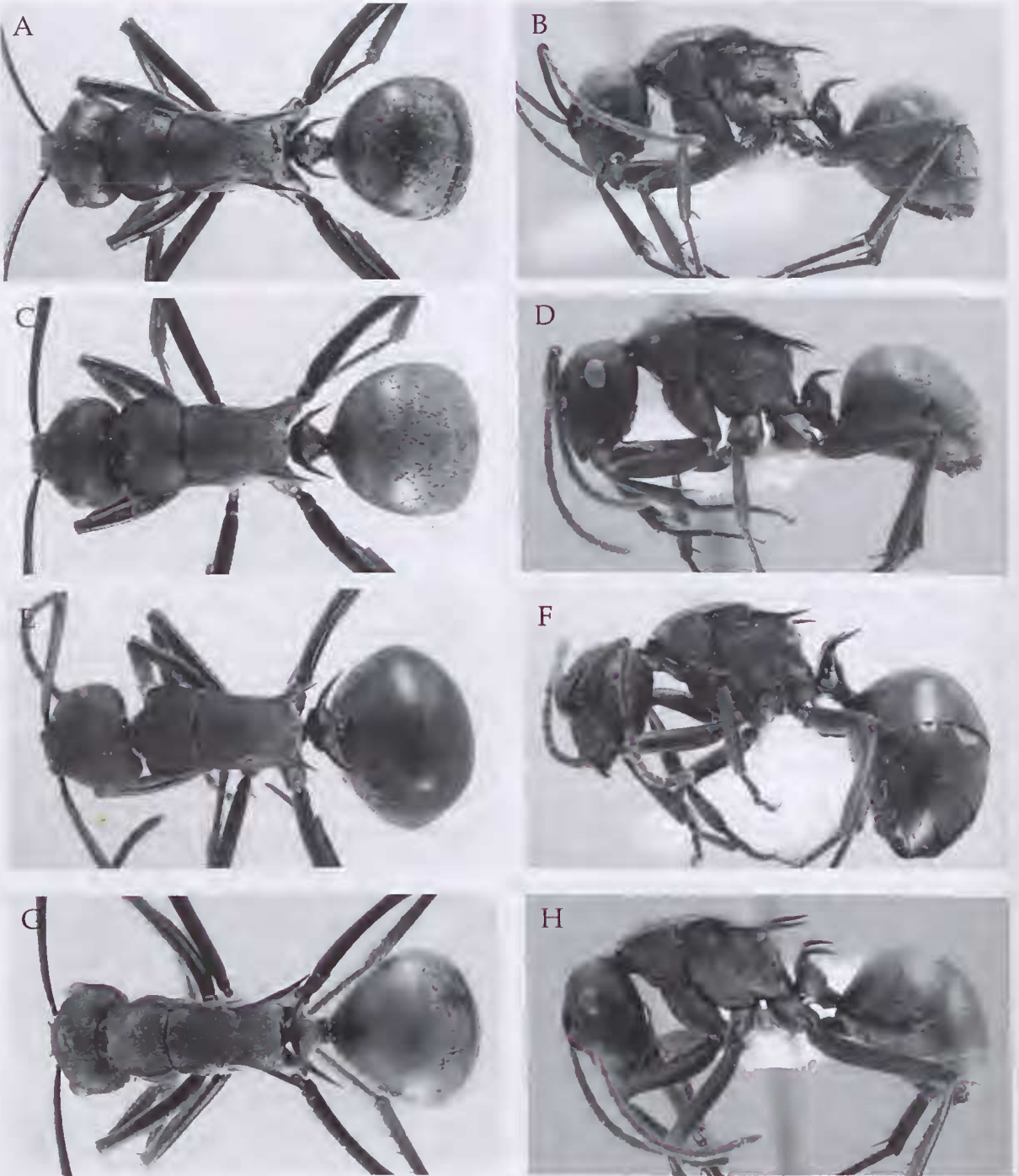


FIG. 6. *Polyrhachis* (*Hagiomyrma*) *penelope* species-group – dorsal (left) and lateral (right) view. A-B, *P. anderseni* sp. nov.; C-D, *P. archeri* sp. nov.; E-F, *P. clarki* sp. nov.; G-H, *P. crawleyi* Forel (not to scale).



**Remarks.** *Polyrhachis archeri* is very similar to *P. anderseni*, with most of the distinguishing characters listed in the remarks on the latter species. It is also similar to *P. hoffmanni*, which shares the same type locality with *P. archeri*. *Polyrhachis hoffmanni* is easily separated by the presence of relatively long hairs over most body surfaces which are completely absent in both the other species. *Polyrhachis archeri* is a ground-nesting species, with the type series specimens collected foraging near a nest entrance hidden under a small rock. The distribution of *P. archeri* appears to be centred on the Gulf Country in north-western Queensland, however, it has recently been collected in the Northern Territory at Nitmiluk (Katherine Gorge) Nat. Park and Standley Chasm in the West MacDonnell Ranges.

*Polyrhachis* (*Hagiomyrma*) *clarki* sp. nov.  
(Fig. 6E-F)

**Etymology.** Named in honour of the collector, the late John Clark, former entomologist at the Museum of Victoria, Melbourne.

**Material.** HOLOTYPE: WA, Geraldton, J. Clark (worker). PARATYPES: data as for holotype (12 workers). Type deposition: Holotype and 8 paratypes in MVMA; 1 paratype each in ANIC, BMNH, MCZC and QM.

**Description.** *Worker.* Dimensions (Holotype cited first): TL c. 7.31, 7.31-7.91; HL 1.78, 1.78-1.93; HW 1.47, 1.47-1.59; CI 82, 81-85; SL 1.96, 1.93-2.18; SI 133, 131-140; PW 1.25, 1.22-1.31; MW 0.72, 0.72-0.81; PMI 174, 162-174; MTL 2.18, 2.15-2.43 (6 measured).

Mandibles with 5 teeth, outer tooth distinctly short and blunt. Anterior clypeal margin with denticulate flange medially, flanked by acute teeth. Clypeus with distinctly raised median carina, shallowly sinuate in profile (almost straight in some specimens); basal margin virtually flat. Frontal triangle distinct. Frontal carinae sinuate with weakly raised margins; central area relatively wide, raised medially with rather short frontal furrow. Sides of head in front of eyes weakly convex, rounding into mandibular bases; behind eyes, sides rounding into convex occipital border. Eyes convex, exceeding lateral cephalic outline. Ocelli

lacking. Pronotal humeri subacute or narrowly rounded in some specimens, margins weakly raised; pronotal dorsum widest at midlength. Pronotal and mesonotal dorsa with lateral margins converging posteriorly; metanotal groove indistinct medially. Propodeal dorsum with margins weakly divergent posteriorly, terminating in slender, acute, divergent, downturned spines. Petiole with anterior face straight, posterior face weakly convex; dorsum deeply concave medially, armed laterally with pair of distinctly elevated, divergent, acute spines. Anterior face of first gastral tergite widely rounding onto dorsum.

Mandibles distinctly longitudinally striate with numerous piliferous pits. Head and mesosoma very finely and closely reticulate-punctate with sculpturation on sides of head and mesosoma somewhat more distinct. Gaster finely shagreened.

Mandibles with several medium length, golden hairs at masticatory borders, distinctly shorter and closely appressed hairs towards mandibular bases. Only a few anteriorly directed setae fringing anterior clypeal margin. Fore coxae and gastral venter and apex with medium length, semierect, golden hairs. Whole dorsum of body, including head, mesosoma, petiole and gaster without hairs, except a few, short hairs on apical gastral tergites. Closely appressed, silvery pubescence sporadically scattered on venter of head, propodeal declivity, venter and sides of gaster; pubescence completely lacking over most dorsal body surfaces, including gaster.

Black; mandibular masticatory borders, condylae and subpetiolar process medium reddish-brown; antennae and tarsi dark reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** The type series are the only specimens known of *P. clarki*. Apart from the holotype, which is in relatively good condition, most of the types are poorly preserved with various legs, antennae and/or gasters missing. *Polyrhachis clarki* is distinguished from other *Hagiomyrma* species by the lack of hairs on the dorsum of the body, the rather short, very

slender, downturned and outwardly directed propodeal spines and the strongly upturned petiolar spines with a deeply concave dorsum between their bases. There is some variation in the form of the pronotal humeri which are either subacute (as in the holotype and some paratypes) or narrowly rounded (in the remaining paratypes).

***Polyrhachis (Hagiomyrma) crawleyi* Forel, 1916**  
(Fig. 6G-H)

*Polyrhachis (Hagiomyrma) ammonoeides* var. *crawleyi* Forel, 1916:447. Syntype workers. Type locality: 'NORTH AUSTRALIA', MHNG, QM (examined).

*Polyrhachis crawleyi* Forel. Kohout, 1988 (raised to species).

**Other Material.** WA: Kimberley region, King Edward R., vi.1988 (ANA) (w); ditto, 10 km S of Beverley Springs Hmsd, v.1979 (B.G. Muir #29) (w); Jack's Waterhole, Duract River Hmsd, 15°50'S, 127°24'E, 7.v.1992 (S.O. Shattuck #3435-3) (w). NT: Kakadu NP, Alligator R., 19-23.vi.1982 (W. Houston) (w); 130 km S of Darwin, 11.ii.1964 (J. Sedláček) (w); Koolpinyah track, c. 24 mi SE of Darwin, 12°23'S, 131°10'E, 9.vii.1951 (W.L. Brown) (w); Batchelor (G.F. Hill) (w); Daly R. (H. Wesselmann) (w); Kidman Springs, v.1999 (A.J. Fisher) (w); Fog Dam, 20.viii.1996 (BDH) (w); Bunda Stn, Victoria R. Distr., v.1994 (A.J. Fisher) (w); Larimah, 10.vii.1985, savannah woodland (BBL) (w). QLD: Cape York Pen., Coen Aerodrome, 26.vi.1960 (C.N. Smithers) (w); Lakefield NP, 14°59'S, 144°15'E, 19-29.vi.1980 (RJK acc. 80.42) (w); ditto, 17 km N Lakefield, 21.vii.2002 (ANA) (w); ditto, White Lily lagoon, 14 km N Lakefield, 19.vii.2002 (ANA) (w); 5-15 mi N of Mareeba, 15.ii.1958 (P.F. Darlington) (w); 15 km N of Maggieville Hmsd, N of Normanton, 11.iv.1962 (J.E. Dowse) (w); Floraville Hmsd, Leichard R. x-ing, 18°13'S, 139°52'E, 7-17.x.1977 (RJK acc. 77.16) (w); Cardwell, 14.ii.1992 (C.J. Hill) (w); 25 km S of Cardwell, 16.iv.1976 (P.J.M. Greenslade) (w); Camooweal, 25.vii.1981 (BBL) (w); Townsville, 3.& 13.xii.1901 (F.P. Dodd) (w, ♀, ♂); Townsville, 11.xi.1948 (Sr Conleth) (w); 6 km NWbyN of Powlathanga, 20°10'S, 146°00'E, c. 350 m, 16.vii.1977 (RWT acc. 77.366) (w); Ayr-Proserpine Hwy, 6-7.ii.1964 (J. Sedláček) (w); Mackay (Turner) (w); 10 km N of Nebo, 16.viii.1975, under log (BBL) (w); Rockhampton, 9.ii.1964 (J. Sedláček) (w).

**Description.** *Worker.* Dimensions (syntypes cited first): TL c. 6.20-6.60, 6.65-8.01; HL 1.53-1.69, 1.53-1.90; HW 1.25-1.31, 1.25-1.47; CI 77-82, 76-82; SL 1.93-2.12, 1.93-2.34; SI 154-162, 154-170; PW 0.87-0.91, 0.87-1.06; MW 0.59, 0.59-0.69; PMI 147, 147-164; MTL 2.25-2.47, 2.25-2.75; (3+25 measured).

Anterior clypeal margin medially with shallow, truncate, denticulate flange, flanked by blunt teeth. Clypeus with distinctly raised median carina; sinuate in profile with moderately impressed basal margin. Frontal triangle poorly indicated. Frontal carinae sinuate with moderately raised margins; central area relatively wide with rather flat frontal furrow. Sides of head in front of eyes converging towards mandibular bases in almost straight line; behind eyes, sides rounding into convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Pronotal humeri dilated, distinctly rounded with weakly raised margins; dorsum with lateral margins distinctly emarginate or notched at about midlength, subparallel or weakly diverging towards promesonotal suture. Lateral margins of mesonotum converging posteriorly and weakly raised towards laterally impressed, medially flat metanotal groove. Propodeal dorsum with margins terminating in broad-based, long, slender, widely divergent, acute spines. Anterior face of petiole in side view rounding dorsally into long, slender, widely divergent spines, dorsum between spines deeply concave. Base of first gastral segment widely rounding onto dorsum.

Mandibles longitudinally striate with numerous piliferous pits. Head and mesosoma closely reticulate-punctate; spines sculptured for most of length, tips smooth. Gaster finely shagreened.

Mandibles with numerous medium length, golden hairs at masticatory borders; distinctly shorter and closely appressed hairs towards mandibular bases. Only a few anteriorly directed setae fringing anterior clypeal margin. Several paired, medium length hairs on clypeus, along frontal carinae and vertex. Somewhat longer, variously inclined hairs on dorsum of mesosoma and fore coxae; distinctly shorter hairs on venter of mid and hind coxae and femora. Gaster with numerous, posteriorly directed golden hairs, rather short on dorsum, distinctly longer and more abundant on venter and around apex. Closely appressed, somewhat medially radiating golden pubescence with somewhat brassy hue, over most dorsal body



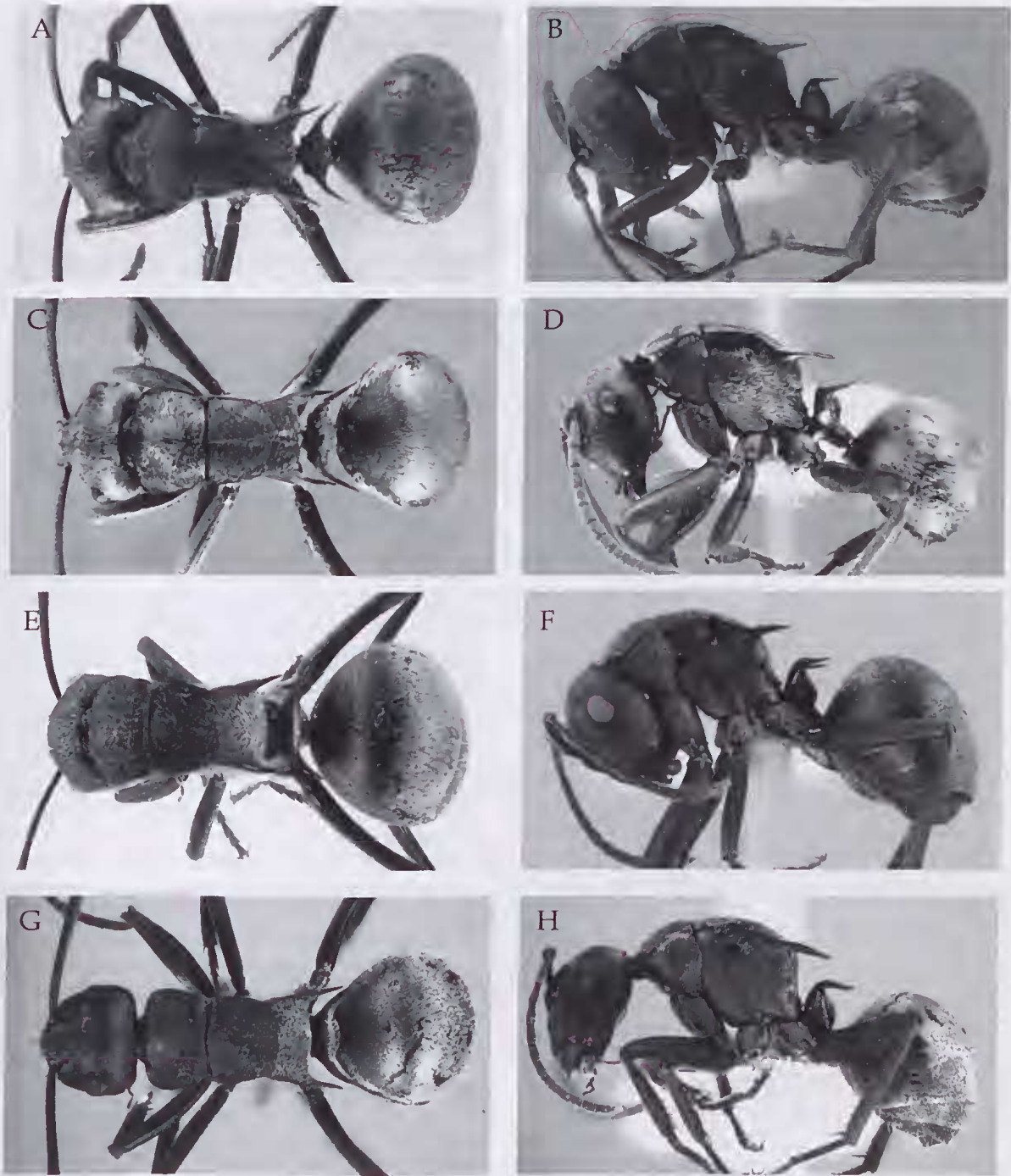


FIG. 7. *Polyrhachis* (*Hagiomyrma*) *penelope* species-group – dorsal (left) and lateral (right) view. A-B, *P. denticulata* Karavaiev; C-D, *P. electra* sp. nov.; E-F, *P. hoffmanni* sp. nov.; G-H, *P. melanura* sp. nov. (not to scale).

surfaces, including dorsum of gaster, where it is rather abundant, completely hiding underlying sculpturation; pubescence more sporadic and mostly silvery on sides of head, mesosoma and venter of gaster.

Black; mandibular teeth and appendages usually very dark reddish-brown.

*Queen*. Dimensions: TL c. 9.83; HL 2.03; HW 1.57; CI 77; SL 2.15; SI 137; PW 1.81; MTL 2.82 (1 measured).

Apart from sexual characters very similar to worker, except: pronotal dorsum with humeri subacute, margins widely rounded behind. Mesoscutum marginally wider than long; median line distinct, bifurcate anteriorly; parapsides flat anteriorly, weakly raised posteriorly; anterior margin of mesoscutum evenly rounded; dorsum relatively low and very weakly convex in lateral view; mesoscutellum only weakly elevated above dorsal plane of mesoscutum. Propodeal and petiolar spines similar to those in worker, but distinctly shorter. Sculpturation, pilosity, pubescence and colour virtually identical to worker.

Male and immature stages were reported in F.P. Dodd's collection, however, their location is unknown and the material is probably lost.

**Remarks.** *Polyrhachis crawleyi* is rather similar to *P. cracenti*, but is separable by its consistently smaller size and closely reticulate-punctate sculpturation of the body, with distinguishing characters provided in the remarks of the latter species. *Polyrhachis crawleyi* is uncommon with a rather patchy distribution across northern Australia. It is apparently restricted to open eucalypt forests and savannah woodlands, preferring patches of bare ground without a covering of grass to excavate their nests.

*Polyrhachis (Hagiomyrma) denticulata*  
Karavaiev, 1927  
(Fig. 7A-B)

*Polyrhachis (Hagiomyrma) denticulata* Karavaiev, 1927e:13, fig. 4. Syntype workers. Type locality: INDONESIA, Ambon I. (= Amboina) (V. Karavaiev #3008), IZAS, QM (examined).

**Other Material.** INDONESIA, IRIAN JAYA: Hollandia, 02°32'S, 140°42'E, 24.i.1960 (T.C. Maa) (w). PAPUA NEW GUINEA: Bismarck Archipelago

(no further data) (w); East New Britain Prov., Ralum, 2.x.1896 (F. Dahl) (w, ♀); Morobe Prov., Lae, 4.viii.1972 (D.H. Messersmith) (w); Northern Prov., Oro Bay, 6.i.1973 (PMR) (w); Buna, 23.iii.1972 (PMR) (w); Milne Bay, 14-23.ii.1969 (J. & M. Sedláček) (w). AUSTRALIA, QLD: Torres Strait, Mabuiag I., 1974 (H&C) (w).

**Description.** *Worker*: Dimensions (syntypes cited first): TL c. 6.20-6.70, 6.00-7.43; HL 1.50-1.59, 1.50-1.75; HW 1.22-1.31, 1.22-1.43; CI 81-82, 80-83; SL 1.68-1.78, 1.68-2.00; SI 136-138, 136-146; PW 1.14-1.25, 1.12-1.34; MW 0.65-0.69, 0.62-0.89; PMI 175-181, 172-185; MTL 1.90-2.00, 1.90-2.37 (2+9 measured).

Mandibles with 5 teeth, distinctly reducing in length towards base. Anterior clypeal margin medially truncate and denticulate, without clearly defined median flange. Clypeus with distinct median carina; sinuate in profile, posteriorly rounding into moderately impressed basal margin. Frontal carinae sinuate with weakly raised margins; central area relatively wide, with medially raised ridge. Sides of head in front of eyes converging towards mandibular bases in straight line; behind eyes, sides rounding into convex occipital margin. Ocelli indistinct. Pronotal dorsum distinctly wider than long; humeri widely rounded with raised, posteriorly converging margins; promesonotal suture distinctly impressed. Mesonotal margins converging posteriorly into medially flat metanotal groove. Propodeal dorsum with lateral margins terminating in more-or-less horizontal, divergent, acute spines. Petiole with anterior face straight, posterior face distinctly swollen; dorsum shallowly concave medially, armed with pair of divergent, weakly elevated, acute spines. Anterior face of first gastral tergite widely rounding onto dorsum.

Mandibles longitudinally striate with numerous piliferous pits; head, mesosoma and petiole reticulate-punctate. Gaster shagreened.

Mandibular masticatory and outer borders with medium length, golden hairs. Anterior clypeal margin medially with several, medium length, golden setae. Numerous, semierect, anteriorly inclined hairs on clypeus, front and vertex of head, a number of hairs fringing outline of head in full face view. Mesosoma



and petiole with numerous erect or semierect hairs; gaster with rather abundant, posteriorly inclined, golden hairs, some longer than half of diameter of eyes. Rather sparse and long, silvery, appressed pubescence, covering most body surfaces; pubescence more abundant on gaster, pale golden on dorsum and silvery on sides and venter.

Head and mesosoma black or very dark reddish-brown; mandibles, clypeus, anterior portion of pronotum, appendages and gaster medium reddish-brown. Colour scheme in older specimens, including syntypes, is generally light, reddish-brown, while more recently collected specimens are distinctly darker, with head and mesosoma almost black.

*Queen*. Dimensions: TL c. 7.15-7.41; HL 1.62; HW 1.31; CI 81; SL 1.78; SI 136; PW 1.51-1.59; MTL 2.09-2.12 (2 measured).

Apart from sexual characters very similar to worker, except: mesoscutum in lateral view relatively low with anterior margin rounding onto flat dorsum; median line bifurcate anteriorly; parapsides flat. Mesoscutellum weakly convex, not elevated above dorsal plane of mesosoma. Propodeal spines very short, subparallel, with tips weakly curved downwards. Petiolar spines very short, divergent. Sculpturation, pilosity, pubescence and colour virtually identical to worker.

Males and immature stages were apparently collected by F. Dahl at Ralum (Bismarck Archipelago) and should be lodged in the MNHU. However, in a recent visit I failed to locate the material and consider it lost.

**Remarks.** *Polyrhachis denticulata* is rather similar to *P. penelope* which resulted in specimens collected by F. Dahl at Ralum, being identified as *P. penelope* by Forel (1901:31). However, the differences separating the species are rather obvious and are discussed in the remarks section under the latter species.

*Polyrhachis* (*Hagiomyrma*) *electra* sp. nov.  
(Fig. 7C-D)

**Material.** HOLOTYPE: QLD, Mt Finnigan, summit, 15°49'S, 145°16'E, 1100 m, 28-30.xi.1985, G.B.

Monteith, D.J. Cook & L. Roberts, QMT174510 (worker). PARATYPES: data as for holotype (20 workers); data as for holotype, except 3-5.xii.1990 (41 workers, 8 ♀, 4 ♂). Type deposition: Holotype, most paratype workers and paratype queens in QM, 3 paratype workers and paratype ♀ in ANIC; 2 paratype workers each in AMNH, BMNH, CASC, MSNG, MCZC, MHNG, MNHU and NMNH.

**Other Material.** QLD: Mt Finnigan, summit, 15°49'S, 145°16'E, 1100 m, 19-21.iv.1982 (GBM, DJC & L. Roberts) (w); Cape Tribulation, Thornton Peak, 16°10'S, 145°23'E, 1374 m, ix.1984 (GBM) (w); Mt Bartle Frere, Sth Peak, 1622 m, 17°24'S, 145°49'E, 8.xi.1981 (GBM & Earthwatch Exp.) (w); 2.5 km WSW of Koomboolooma T'ship, 17°50'S, 145°34'E, 740 m, 4.ii-15.iv.1999 (GBM & S.R. Monteith) (w); Cardwell Ra., Macalister Mtn, 18°18'S, 145°55'E, 800-900 m, 13-16.i.1987 (S. Hamlet) (w); Cardwell Ra., Upper Broadwater Ck, 7-21.xii.1986 (GBM, GIT & S. Hamlet) (w).

**Description.** *Worker*. Dimensions (holotype cited first): TL c. 7.06, 6.45-7.51; HL 1.81, 1.56-1.84; HW 1.50, 1.33-1.56; CI 83, 81-88; SL 2.00, 1.75-2.03; SI 133; 127-137; PW 1.37, 1.22-1.47; MW 0.87, 0.81-0.87; PMI 157, 157-178; MTL 2.18, 1.96-2.28 (23 measured).

Anterior clypeal margin with median, obtusely denticulate flange, laterally flanked by acute angles. Clypeus with distinct longitudinal carina, sinuate in profile; basal margin only weakly impressed. Frontal triangle indistinct. Frontal carinae sinuate with weakly raised margins anteriorly, flat posteriorly; central area wide with poorly indicated frontal furrow. Sides of head in front of eyes converging towards mandibular bases in straight line; behind eyes, sides rounding into weakly convex occipital margin. Eyes moderately convex, in full face view marginally breaking lateral cephalic outline. Ocelli lacking, positions of lateral ocelli indicated by weakly raised tubercles in cephalic sculpture. Pronotal dorsum wider than long with humeri distinctly rounded, dorsally shallowly concave; lateral margins converging posteriorly towards well impressed promesonotal suture. Mesonotal dorsum with margins converging posteriorly; metanotal groove weakly indicated laterally, indistinct medially. Propodeum with margins divergent, terminating in slender, subparallel spines with tips weakly turned outwards. Propodeal spiracles situated on laterally projecting

tubercles. Petiole with anterior face straight, rounding dorsally into slender, divergent, elevated spines with tips curved upwards; dorsum descending posteriorly towards base in convex line. Anterior face of first gastral tergite widely rounding onto dosum.

Mandibles with numerous piliferous pits, closely and finely longitudinally striate at their bases, more polished towards masticatory borders. Head, mesosoma and petiole reticulate-punctate; spines sculptured at bases, smooth and polished towards tips. Gaster finely shagreened.

Mandibular masticatory borders with several, anteriorly inclined, golden hairs. Anterior clypeal margin with only a few anteriorly directed setae medially and fringe of shorter setae laterally. Several paired, relatively short hairs on clypeus, along frontal carinae and on vertex, no hairs exceeding lateral cephalic outline. Dorsum of mesosoma, coxae and venter of femora with several erect or suberect, short to medium length hairs. Gaster with a number of medium length hairs dorsally; hairs distinctly longer and more abundant around apex and venter of gaster. Rather abundant, closely appressed, golden pubescence on dorsum of head, mesosoma and petiole; more diluted, silvery pubescence on sides of body and base of petiole. Gaster dorsally with rich golden pubescence, completely hiding underlying sculpturation; pubescence distinctly less dense and silvery on gastral venter.

Black; mandibular teeth reddish-brown, appendages and apex of gaster dark to very dark reddish-brown.

*Queen*. Dimensions: TL c. 8.57-8.82; HL 1.90-1.95; HW 1.62-1.65; CI 84-85; SL 2.00-2.03; SI 123-125; PW 1.84-1.93; MTL 2.31-2.37 (4 measured).

Apart from sexual characters very similar to worker except: pronotal humeri widely rounded. Mesoscutum marginally wider than long; median line bifurcate anteriorly; dorsum flat in profile with parapsides only weakly raised posteriorly. Mesoscutellum flat, not elevated above dorsal plane of mesosoma.

Propodeal and petiolar spines similar to worker, but shorter. Sculpturation, pilosity, pubescence and colour identical to worker.

Males present in QM spirit collection. Immature stages unknown.

**Etymology.** Name derived from *Electra*, a daughter of Agamemnon and Clytemnestra, of Greek mythology.

**Remarks.** *Polyrhachis electra* is somewhat similar to *P. penelope*, but differs in having the propodeal spiracles situated on laterally projecting tubercles. However, the spiracular tubercles are shorter and less conspicuous than those in *P. diversa* and *P. tubifera*. *Polyrhachis electra* differs from *P. penelope* in the shape of the petiolar spines which are longer and obliquely elevated in *P. electra*, and horizontal in *P. penelope*. In addition, the pubescence in *P. electra* is rather golden and abundant over all dorsal body surfaces, while it is much diluted and more silvery or pale golden in *P. penelope*.

*Polyrhachis electra* appears to be restricted to the Wet Tropics region of northern Queensland with all specimens having been collected at high altitude localities above 700 m in elevation. It is a ground-nesting species with entrances usually hidden under a rock. *Polyrhachis electra* was listed earlier by Kohout (2000: 199) as 'Hagio 04'.

*Polyrhachis (Hagiomyrma) hoffmanni* sp. nov.  
(Fig. 7E-F)

**Etymology.** Named in honour of one of the collectors, Ben Hoffmann, of the CSIRO, TERC, Darwin, who has collected extensively across the Northern Territory, including Arnhem Tableland and adjacent islands.

**Material.** HOLOTYPE: QLD, Riversleigh Stn, c. 6 km NW of, 19°00'S, 138°41'E, 18-26.x.1977, R.J. Kohout acc. 77.22, QMT174511 (worker). PARATYPES: data as per holotype (4 workers); Lawn Hill Stn, CRA Century Project, 18°30'S, 138°10'E, iv.& ix.1991 (A.N. Andersen) (2 workers). Type deposition: Holotype and 1 paratype in QM; 1 paratype each in ANIC, BMNH and MCZC.

**Other Material.** QLD: Mt Isa, xi.1997 (BDH) (w, ♀); Mt Isa, CRC MIM study, xii.1997 (T. Griffiths) (w); Mt Isa, Plume Outfall Study, v.2005 (T. Griffiths) (w); 3 km along Davies Ck Rd, nr Mareeba, 3.viii.1975 (B.B. Lowery) (w).



**Description.** *Worker.* Dimensions (holotype cited first): TL c. 6.60, 5.81-6.69; HL 1.62, 1.53-1.62; HW 1.34, 1.25-1.34; CI 83, 82-83; SL 1.87, 1.75-1.87; SI 139, 133-142; PW 1.31, 1.20-1.31; MW 0.87, 0.78-0.87; PMI 150, 149-156; MTL 2.09, 1.93-2.09 (5 measured).

Anterior clypeal margin with denticulate median flange, laterally flanked by distinct, acute teeth. Clypeus with median carina; almost straight in profile, posteriorly rounding into shallow basal margin. Frontal triangle distinct. Frontal carinae with weakly and narrowly raised margins anteriorly, flat posteriorly; central area relatively wide with distinct frontal furrow. Sides of head in front of eyes converging in straight line towards mandibular bases; behind eyes, sides widely rounding into convex occipital margin. Eyes moderately convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri widely rounded; dorsum distinctly wider than long, widest near mid-length. Promesonotal suture distinct; mesonotal lateral margins converging posteriorly towards medially indistinct metanotal groove. Propodeum armed with relatively short, weakly divergent spines. Petiolar dorsum distinctly concave medially, armed with divergent, weakly elevated, acute spines; posterior face of petiole strongly convex (Fig. 7F). Anterior face of first gastral tergite distinctly higher than full height of petiole, widely rounding onto dorsum.

Mandibles densely longitudinally striate with piliferous pits towards masticatory borders. Head, mesosoma and petiole closely reticulate-punctate. Spines sculptured from bases, tips smooth and polished. Gaster shagreened with sculpture distinctly coarser on dorsum.

Mandibles at masticatory and along outer borders with several, anteriorly inclined, golden hairs. Anterior clypeal margin medially with a few, anteriorly directed setae and fringe of shorter setae laterally. Several, mostly paired, rather long, curved hairs on clypeus, along frontal carinae, vertex and occipital corners; no hairs breaking lateral cephalic outline between eyes and mandibular bases in full frontal view. Long, variously curved hairs, as long as or

longer than greatest diameter of eyes, scattered over most body surfaces. Gaster with abundant, long, posteriorly inclined, silvery hairs. Relatively long, silvery, appressed pubescence, generally untidy and rather diluted on dorsum of head and mesosoma; pubescence somewhat denser on pronotal shoulders and propodeal declivity. Gaster with abundant, golden, appressed pubescence on dorsum, completely hiding underlying sculpturation; pubescence silvery and much diluted on gastral venter.

Black; mandibles relatively light, reddish-brown, with teeth and outer borders lined with black. Clypeus, central area and appendages medium to dark reddish-brown; anterior clypeal margin and frontal carinae with narrow black margins. Gaster distinctly reddish-brown on venter.

*Queen.* Dimensions: TL c. 8.01; HL 1.78; HW 1.43; CI 80; SL 1.90; SI 133; PW 1.72; MTL 2.15 (1 measured).

Apart from sexual characters very similar to worker except: mesoscutum wider than long with virtually flat dorsum in lateral view; median line distinct; parapsides flat. Mesoscutellum weakly convex, only marginally elevated above dorsal plane of mesosoma. Propodeal spines very short, bases broad; petiolar spines shorter than in worker, distinctly obliquely elevated, divergent. Sculpturation, pilosity and pubescence identical to worker. Colour generally as in worker, with only mandibles and appendages very dark, reddish-brown.

Males and immature stages unknown.

**Remarks.** *Polyrhachis hoffmanni* is very similar to the sympatric *P. archeri* and *P. anderseni* but differs in the shape of the petiolar node, as discussed in the remarks section of *P. archeri*. *Polyrhachis hoffmanni* can also be easily separated by the relatively long hairs on most body surfaces which are completely absent in the two other species.

*Polyrhachis* (*Hagiomyrma*) *melanura* sp. nov.  
(Fig. 7G-H)

**Etymology.** Derived from the Greek word *melanos*, meaning black, for its uniformly black colour.

**Material.** HOLOTYPE: QLD, Britton Ra., 6 km NNE of Homevale, 21°23'S, 148°33'E, 1-6.iv.1975, ex nest in ground, R.J. Kohout acc. 75.154, QMT174512 (worker). PARATYPES: data as for holotype (69 paratype workers). Type distribution: Holotype and most paratypes in QM; 2 paratype workers each ANIC, BMNH, MCZC.

**Other Material.** WA: Kimberley region, Cape Bougainville, 14°05'S, 126°08'E, vi.1988 (ANA) (w); Boongarree I., 15°05'S, 125°11'E, vi.1988 (ANA) (w); Glenelg R., 15°48'S, 124°44'E, vi.1988 (ANA) (w); JoonJoo Str., v.2002 (C. Palmer) (w); Yampi 1 & 2 Stns, v.2002 (C. Palmer) (w); Beagle Bay, vi.2001 (C. Palmer) (w); Purnululu NP, 5.ix.2004 (L. Barrow) (w). NT: Wessel Is, Rimbija I., 11°01'S, 136°45'E, 3-14.ii.1977 (TAW) (w); Groote Eylandt, UmbaKumba, 11-22.vi.1948 (R.R. Miller) (w); Groote Eylandt, vi.1982 (JDM) (w); Kakadu NP, Ubirr, 3.vi.1986 (ANA) (w); ditto, x.1988-vi.1989 (ANA) (w, ♀); Holmes Jungle, 15 km NE of Darwin, 12°25'S, 130°58'E, 11-12.ii.1994, ex nest in ground (RJK accs 94.9, 13) (w, ♀); Darwin region, 'Pethericks', 9.vii & 25.x.1986 (ANA) (w); Howard Springs, 1.xi.1990 (BDH) (w). QLD: Cape York Pen., Weipa, MRRP study site N3b, v-vi.1995 (ANA) (w); Split Rock, 12km SE of Laura, 15°38'S, 144°30'E, c. 120m, 4.xii.1985 (RJK acc. 85.1) (w); Jane Table Hill, Princess Charlotte Bay, 14°30'S, 144°08'E, 28.vi.1980 (RJK acc. 80.48) (w); Davis Ck, 15 km E of Mareeba, 17°00'S, 145°34'E, 15.vi.1980 (RJK acc. 80.25) (w); 2.5km N of Fanning R. Hmsd, 19°42'36"S, 146°25'53"E, 10.ii.2007 (GBM) (w); Lolworth NP, 19°49'41"S, 146°5'26"E, 13.xii.2006 (S. Wright) (w); ditto, 19°49'42"S, 146°5'26"E, 28.ix-12.xii.2006 (QM Party) (w); 14 km E of Mingela, 5.i.1977 (BBL) (w); Red Falls, basalt, 19°55'33"S, 145°44'1"E, 16.xii.2006 (GBM) (w); Britton Ra., 6 km NNE of Homevale, 21°23'S, 148°33'E, 1-6.iv.1975, ex nest in ground (RJK acc. 75.153, 165/1) (w); Rundle Ra., 36 km NW of Gladstone, 23°39'S, 150°58'E, 24-30.iii.1975 (RJK acc. 75.116/3) (w).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 6.70, 5.85-6.77; HL 1.65, 1.50-1.72; HW 1.37, 1.22-1.43; CI 84, 80-84; SL 2.06, 1.81-2.06; SI 150, 144-151; PW 1.28, 1.12-1.31; MW 0.97, 0.81-0.97; PMI 132, 129-145; MTL 2.12, 1.87-2.25 (15 measured).

Anterior clypeal margin with denticulate, median flange, laterally flanked by acute angles. Clypeus with median carina; weakly sinuate in profile (almost straight in some specimens), posteriorly rounding into moderately impressed basal margin. Frontal triangle indistinct. Frontal carinae sinuate with weakly raised margins; central area flat. Sides of head in front of eyes converging towards mandibular bases in very weakly convex

line; behind eyes, sides rounding into convex occipital margin. Eyes only moderately convex, in full face view not or only marginally exceeding lateral cephalic outline. Ocelli lacking, position of median ocellus indicated by shallow pit in some specimens. Pronotal humeri widely rounded with anterior margins weakly raised; pronotal dorsum widest at mid-length, lateral margins weakly emarginate medially before terminating in distinctly impressed promesonotal suture. Mesonotal dorsum with lateral margins converging towards indistinct metanotal groove. Propodeal dorsum armed with slender, moderately long, subparallel spines with tips weakly curved outwards. Petiole with posterior face distinctly swollen; dorsum weakly concave medially, laterally armed with pair of slender, obliquely elevated, divergent spines with tips curved upwards. Anterior face of first gastral tergite widely rounding onto dorsum.

Mandibles densely and closely longitudinally striate with piliferous pits. Head, mesosoma and petiole very densely, reticulate-punctate; sculpturation rather flat with distinctly matt-opaque appearance, including on spines. Gaster very closely shagreened, opaque.

Mandibles at masticatory borders with numerous, curved, golden hairs. Anterior clypeal margin with only a few, anteriorly directed setae medially. Dorsa of head and mesosoma with several, rather scattered, very short, bristle-like, pale golden hairs; only a few short hairs on anterior face of fore coxae and venter of mid and hind coxae and femora; no hairs fringing lateral outline of head or antennal scapes. Gastral dorsum with several, very short, posteriorly inclined hairs; somewhat more abundant, marginally longer and posteriorly inclined, pale golden or silvery hairs around apex and on venter of gaster. Rather short, appressed, silvery pubescence in various densities over most body surfaces; pubescence pale golden and denser, hiding underlying sculpturation medially, on dorsum of gaster.

Black; mandibles and appendages black or very dark reddish-brown.



*Queen*. Dimensions: TL c. 7.16-7.71; HL 1.68-1.75; HW 1.31-1.40; CI 78-80; SL 1.90-1.93; SI 138-1.47; PW 1.68-1.72; MTL 2.15-2.18 (3 measured).

Apart from sexual characters, very similar to worker except: pronotal humeri widely rounded with indication of blunt humeral angles. Mesoscutum wider than long, with relatively low and virtually flat dorsum in lateral view; anterior margin evenly rounded in dorsal view; median line distinct; parapsides flat. Mesoscutellum only marginally elevated above dorsal plane of mesosoma. Propodeal spines shorter than in worker, tips weakly curved outwards. Petiolar spines short, weakly elevated and divergent. Sculpturation, pilosity, pubescence and colour identical to worker.

Males unknown; immature stages (larvae in various stages of development and pupae from holotype colony) present in the QM spirit collection.

**Remarks.** *Polyrhachis melanura* is one of several species that is very similar to *P. penelope*, but can be easily separated by its distinctly dull appearance, the swollen posterior face of its petiole (Fig. 7H) and its obliquely elevated petiolar spines. In contrast, the sculpturation in *P. penelope* is somewhat more lucid and semi-polished, the oblique posterior face of the petiole is only weakly convex (Fig. 8B) and the petiolar spines are horizontal.

*Polyrhachis melanura* is a widespread and relatively common species along the northern and northeastern Australian seaboard. It ranges from the Kimberley region in the north-west, to Cape York Peninsula in the east, and south to Rundle Range near Gladstone. It seems to prefer open forests and savannah woodlands, where it builds nests in the ground with the entrances usually hidden under a rock or piece of wood. *Polyrhachis melanura* was listed as *P. 'Hagio 11'* by Kohout (2000: 199).

***Polyrhachis* (*Hagiomyrma*) *penelope* Forel, 1895**  
(Fig. 8A-B)

*Polyrhachis penelope* Forel, 1895:46. Syntype workers. Type locality: QLD, Mackay (G. Turner), MHNC, ANIC, QM (examined).

*Polyrhachis* (*Hagiomyrma*) *penelope* Forel. Forel, 1915:108 (combination in *P. (Hagiomyrma)*).

**Other Material.** QLD: Stratford-Cairns, 2.viii.1975 (BBL) (w); Cairns, 2.viii.1975 (BBL) (w); Yarrabah, c. 9 km E of Cairns, 16°54'S, 145°51'E, 22-24.vii.1980 (RJK acc. 80.121) (w); Millstream NP, nr Ravenshoe, 6.viii.1975 (BBL) (w); Jourama Falls, Paluma NP, 5.viii.2002 (ANA) (w); Mt Elliot NP, Alligator Ck, 19°26'S, 146°57'E, 11.vi.1987 (RJK acc. 87.88) (w); Toomba, 19°58'5"S, 145°34'49"E, 14-16.xii.2006 (S. Wright) (w); 20 km S of Bowen, 17.viii.1975 (BBL) (w); Brampton I., 20°49'S, 149°16'E, 1.i.1979 (RJK acc. 79.1) (w); Cape Hillsborough NP, 20°53'S, 149°01'E, 2.i.1979 (RJK accs 79.4, 10) (w); ditto, 12.iv.1981 (RJK acc. 81.82) (w, ♀); ditto, 22.x.1995 (SKR #42, 45, 50, 51) (w); 1.5 km SE of Mt Ossa, 20°58'S, 148°50'E, 28.xi.1976 (RJK acc. 76.93) (w); Eungella NP, Finch Hatton Gorge, 21°04'S, 148°38'E, 7-13.iv.1975 (RJK acc. 75.171) (w); Mt Blackwood NP, 21°02'S, 148°56'E, 14.iv.1981 (RJK accs 81.99, 109) (w); Britton Ra., 6 km NNE of Homevale, 21°23'S, 148°33'E, 1-6.iv.1975 (RJK acc. 75.169) (w); Mt Pollux, SW base, 22°28'43"S, 147°52'9"E, 12-13.i.2006 (CJB) (w); Lords Table, W base, 22°39'35"S, 148°0'27"E, 8.iii.2006 (GBM) (w); ditto, SE base, 22°40'29"S, 148°1'13"E, 13.i-9.iii.2006 (CJB, GBM) (w); Scotts Peak, SE base, 22°51'44"S, 148°13'31"E, 9.iii.2006 (CJB, GBM) (w); Mt Archer, nr Rockhampton, 23°20'S, 150°34'E, 4.xii.1976 (RJK acc. 76.112) (♀).

**Description.** *Worker*: Dimensions (syntypes cited first): TL c. 6.65-7.61, 6.50-7.61; HL 1.68-1.75, 1.65-1.78; HW 1.40-1.46, 1.34-1.59; CI 80-81, 80-85; SL 2.03-2.09, 2.03-2.15; SI 145-149, 135-151; PW 1.28-1.40, 1.28-1.47; MW 0.90-1.03, 0.84-1.03; PMI 139-142, 139-154; MTL 2.06-2.18, 2.06-2.34 (5+10 measured).

Anterior clypeal margin with denticulate median flange, laterally flanked by acute angles. Clypeus with distinct median carina; sinuate in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle weakly indicated. Frontal carinae sinuate with only weakly raised margins; central area flat. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes, sides rounding into convex occipital margin. Eyes moderately convex, in full face view marginally exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri widely rounded with anterior margins weakly raised; pronotal margins weakly emarginate medially before terminating at well impressed promesonotal suture. Mesonotal dorsum with lateral margins converging towards indistinct

metanotal groove. Propodeal dorsum armed with moderately long, weakly divergent spines with tips weakly curved outwards. Petiole with posterior face descending towards base in weakly convex line; dorsum weakly concave medially, laterally armed with pair of broad-based, horizontal, divergent spines. Anterior face of first gastral tergite distinctly higher than full height of petiole, widely rounding onto dorsum.

Mandibles longitudinally striate with numerous piliferous pits. Head, mesosoma and petiole distinctly, more-or-less regularly reticulate-punctate, with punctures very smooth, polished. Spines sculptured at bases, smooth and polished towards tips. Gaster finely shagreened.

Mandibular masticatory borders with numerous, curved, golden hairs. Anterior clypeal margin with a few, anteriorly projecting setae medially and several very short setae fringing margin laterally. Dorsa of head, mesosoma and petiole with numerous, rather short, erect, bristle-like hairs; a few hairs fringing anterior face of fore coxae and venter of mid and hind coxae and femora. Gaster with more abundant, golden hairs on dorsum; distinctly longer, posteriorly directed hairs around apex and on venter. Rather diluted, closely appressed, silvery pubescence on dorsa of head and mesosoma; pubescence more abundant on sides of mesosoma, declivity and petiole, except its smooth and polished anterior face. Gaster with abundant golden pubescence on dorsum, hiding underlying sculpturation; pubescence much diluted and silvery on venter of gaster.

Black; mandibular teeth reddish-brown.

*Queen.* Dimensions: TL c. 8.52; HL 1.81; HW 1.53; CI 84; SL 2.03; SI 133; PW 1.72; MTL 2.18 (1 measured).

Apart from sexual characters, very similar to worker except: mesoscutum as wide as long; relatively low in lateral view, anteriorly rounding onto very weakly convex dorsum; median line bifurcate anteriorly; parapsides weakly raised. Mesoscutellum only marginally

raised above dorsal plane of mesosoma. Propodeal and petiolar spines similar to worker, but shorter. Sculpturation, pilosity, pubescence and colour identical to worker, except pilosity on dorsum of mesoscutum completely lacking.

Male unknown. Immature stages present in the QM collection.

**Remarks.** *Polyrhachis penelope* is an uncommon species with its distribution centred on Mackay and extending along the Queensland coast from about Rockhampton as far north as Cairns. It is an inhabitant of open eucalypt forests and woodlands that mostly nests in the ground although one nest was located in a rotten tree stump.

*Polyrhachis (Hagiomyrma) pilbara* sp. nov.  
(Fig. 8C-D)

**Etymology.** After the type locality, the Pilbara region in the north-west of Western Australia.

**Material.** HOLOTYPE: WA, Pilbara region, Hamersley Ra., Dales Gorge, 24.iv.1963, McInnes & Dowse (worker). PARATYPES: data as for holotype (4 workers); Wittenoom, c. 20 km N of, 23.iv.1963, McInnes & Dowse (6 workers). Type deposition: Holotype and 2 paratypes in ANIC; 2 paratypes each in QM, BMNH, MCZC and WAMP.

**Other Material.** WA: Barlee Ra., vi.1994 (S.van Leeuwin) (2w in CURT - Heterick #816 and JDM #901 collection identified and labelled as '*Hagio* 22').

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 7.76, 6.85-8.16; HL 1.87, 1.65-1.90; HW 1.47, 1.34-1.50; CI 79, 76-81; SL 2.28, 2.06-2.34; SI 155, 150-159; PW 1.37, 1.28-1.43; MW 0.81, 0.73-0.87; PMI 169, 164-175; MTL 2.40, 2.09-2.50 (11 measured).

Anterior clypeal margin with shallow, denticulate flange, flanked laterally by acute teeth. Clypeus with median carina; virtually straight in profile, posteriorly rounding into shallow basal margin. Frontal triangle poorly indicated. Frontal carinae sinuate with only weakly raised margins. Sides of head converging towards mandibular bases in almost straight line; behind eyes, sides rounding into convex occipital margin. Eyes only moderately convex; in full face view not or only marginally exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri rounded with



weakly raised margins; pronotum widest at mid-length. Promesonotal suture distinctly impressed. Lateral margins of mesonotum converging towards indistinct metanotal groove. Propodeal margins terminating in weakly divergent spines; spines horizontal from bases and weakly curving downwards at midlength. Petiole rather broad at base in lateral view; dorsum weakly concave medially, armed with divergent spines elevated from bases, tips upturned. Anterior face of first gastral tergite distinctly higher than full height of petiole, widely rounding onto dorsum.

Mandibles longitudinally striate with piliferous pits. Head, mesosoma and petiole reticulate-punctate, sculpturation mostly longitudinal on vertex and dorsum of mesosoma. Spines distinctly sculptured for most of length, only tips smooth and polished. Gaster closely reticulate-punctate.

Mandibular masticatory and outer borders with numerous, curved, golden hairs. Anterior clypeal margin with several anteriorly projecting longer setae medially and a few short setae fringing margin laterally. Numerous, medium length, erect, golden hairs on most body surfaces, including appendages; antennal scapes, sides of head in full face view and pronotal humeri in dorsal view distinctly fringed with short bristle-like hairs. Gaster with hairs somewhat longer and posteriorly directed, notably around apex and on venter. Dorsum of gaster with closely appressed, golden pubescence, completely hiding underlying sculpturation; pubescence much diluted on gastral venter.

Black; mandibles, appendages, including coxae and gaster medium reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** Rather coarsely reticulate-punctate sculpturation and the bristle-like hairs along the antennal scapes, make *P. pilbara* a very characteristic representative of the *pilbara*-complex within the *penelope*-group. It appears restricted to the mulga and spinifex clad hills of the Pilbara region of north-western Western

Australia. Nothing is known about its biology or nesting habits.

*Polyrhachis* (*Hagiomyrma*) *placida* sp. nov.  
(Fig. 8E-F)

**Etymology.** Derived from the Latin *placidus*, meaning quiet, tranquil, in reference to the peaceful and serene western slope of the Atherton Tableland that surrounds the type locality.

**Material.** HOLOTYPE: QLD, Herberton, 10 km W, 15.ix.1981, savannah woodland, B.B. Lowery (worker). PARATYPES: data as for holotype (2 workers). Type deposition: Holotype and 1 paratype in ANIC; 1 paratype in QM.

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 6.80, 6.60-6.80; HL 1.59, 1.56-1.59; HW 1.23, 1.22-1.25; CI 77, 77-79; SL 1.78, 1.75-1.78; SI 145, 142-146; PW 1.09, 1.03-1.09; MW 0.65, 0.62-0.65; PMI 168, 163-168; MTL 2.09, 1.93-2.09 (3 measured).

Anterior clypeal margin with acutely denticulate, median flange. Clypeus with median carina; distinctly sinuate in profile with moderately impressed basal margin. Frontal carinae sinuate with weakly raised margins at midlength, flat posteriorly; central area relatively wide, flat with poorly indicated frontal furrow. Sides of head in front of eyes converging towards mandibular bases in straight line; behind eyes, sides widely rounding onto convex occipital margin. Eyes convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with weakly raised, bluntly angular humeri; lateral margins converging towards distinct promesonotal suture. Mesonotal margins converging posteriorly; metanotal groove indistinct. Propodeal margins terminating in divergent, relatively short, weakly curved, spines. Petiole with anterior face straight, posterior face convex; dorsum shallowly concave medially, armed with slender, divergent, weakly elevated spines. Anterior face of first gastral tergite distinctly higher than full height petiole, widely rounding onto dorsum.

Mandibles finely striate at bases, rather smooth with numerous piliferous pits towards masticatory borders. Head, mesosoma and

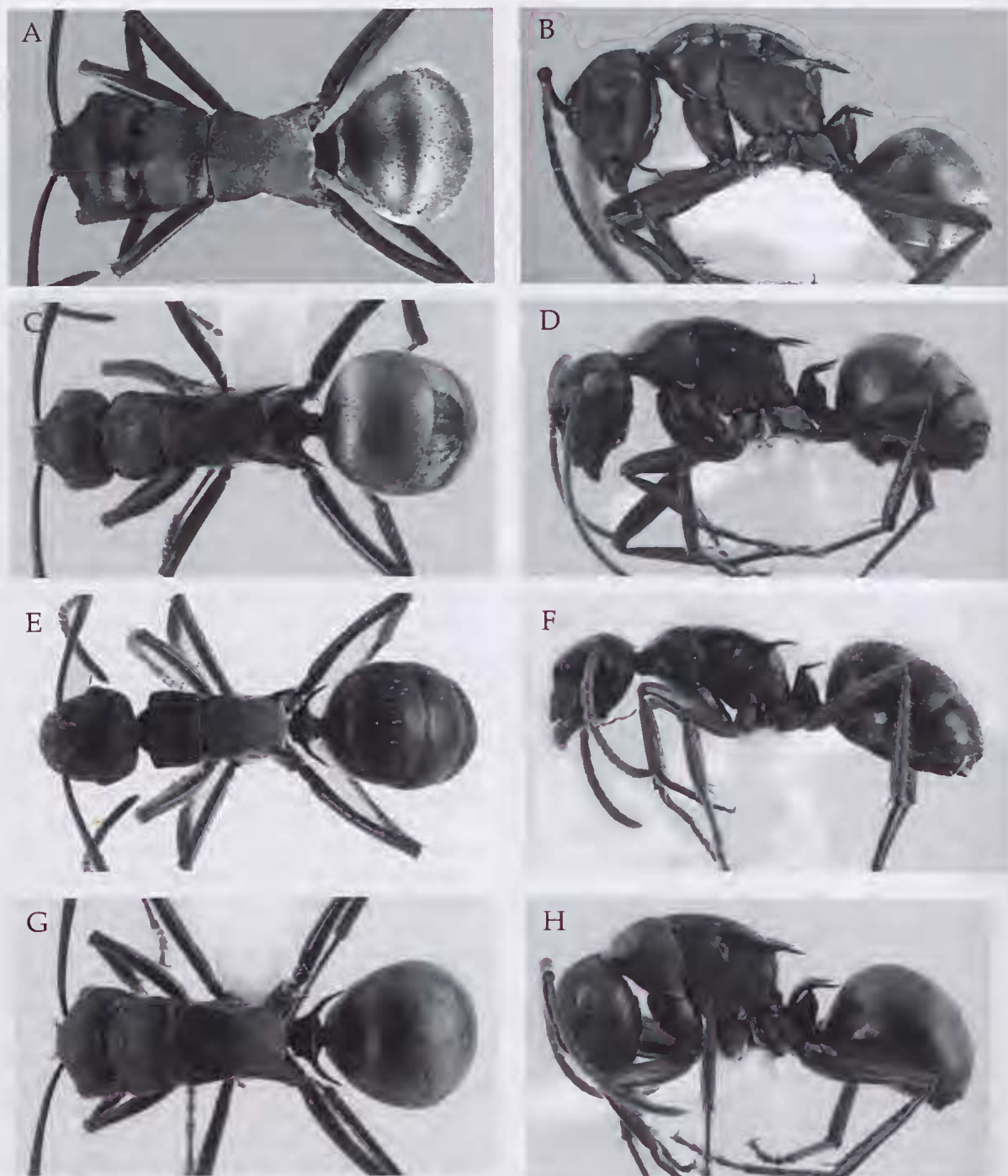


FIG. 8. *Polyrhachis* (*Hagiomyrma*) *penelope* species-group – dorsal (left) and lateral (right) view. A-B, *P. penelope* Forel; C-D, *P. pilbara* sp. nov.; E-F, *P. placida* sp. nov.; G-H, *P. seducta* sp. nov.; (not to scale).



petiole distinctly reticulate-punctate. Spines sculptured from bases up to midlength, smooth and polished towards tips. Gaster shagreened.

Mandibles with numerous, curved, golden hairs and closely appressed hairs towards bases. Anterior clypeal margin with several longer setae medially and fringe of shorter setae laterally. Numerous, mostly medium length, erect, golden hairs on most body surfaces, including appendages; antennal scapes with very short, bristle-like hairs; head in full face view with a few short hairs between eyes and mandibular bases and numerous, distinctly longer hairs fringing occipital margin. Gastral pubescence posteriorly directed and somewhat longer around apex and on venter.

Black; mandibles and legs, including coxae, light to medium reddish-brown; antennae and gaster dark reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis placida* is similar to *P. lydiae*, but has a virtually black body while in *P. lydiae* the body is bright metallic green with the front of head and anterior portion of the pronotum distinctly light reddish-brown. It also closely resembles *P. stricta* described below, however they differ in numerous characters, including the more strongly posteriorly converging promesonotal margins in *P. stricta* (PMI >190 versus PMI <168 *P. placida*). *Polyrhachis placida* is apparently a ground-nesting species with the known specimens collected from under a rock in savannah woodland. *Polyrhachis* 'Hagio 17' listed by Kohout (2000: 200) actually consisted of two species, *Polyrhachis placida* and *P. stricta*.

*Polyrhachis* (*Hagiomyrma*) *seducta* sp. nov.  
(Fig. 8G-H)

**Etymology.** Derived from the Latin *seductus*, meaning remote, distant, in reference to the species rather isolated occurrence on Barrow Island.

**Material.** HOLOTYPE: WA, Barrow Island., 20°47'S, 115°26'E, 24.iv.2005, S. Callan (worker). PARATYPE: data as for holotype (1 worker). Type deposition: Holotype in WAMP, paratype in QM.

**Other Material.** WA, Barrow I., 20°47'S, 115°27'E, 24.iv.2005 (S. Callan) (w); ditto, 17.v.2005 (S. Callan) (w); ditto, 20°46'S, 115°24'E, ii.1977 (H. Heatwole) (w).

**Description.** *Worker:* Dimensions (holotype cited first) TL c. 6.85, 5.64-7.31; HL 1.75, 1.47-1.75; HW 1.40, 1.18-1.40; CI 80, 80-83; SL 2.06, 1.68-2.06; SI 147, 140-150; PW 1.28, 1.09-1.28; MW 0.82, 0.65-0.84; PMI 156, 156-174; MTL 2.21, 1.72-2.28 (6 measured).

Anterior clypeal margin with denticulate, median flange. Clypeus with median carina, weakly sinuate in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle indistinct. Frontal carinae sinuate with weakly raised margins; central area flat with distinct frontal furrow. Sides of head in front of eyes converging in virtually straight line towards mandibular bases; behind eyes, sides rounding into convex occipital margin. Eyes moderately convex, in full face view marginally exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri rounded with anterior margins weakly raised; pronotal dorsum widest at midlength, lateral margins converging into distinctly impressed promesonotal suture. Mesonotal dorsum with lateral margins converging towards indistinct metanotal groove. Propodeal dorsum armed with moderately long, weakly divergent spines. Petiole with posterior face distinctly swollen (Fig. 8H); dorsum armed with pair of slender, divergent spines with tips weakly curved upwards. Anterior face of first gastral tergite widely rounding onto dorsum.

Mandibles finely longitudinally striate with piliferous pits. Clypeus closely punctate. Head reticulate-punctate, sculpturation on vertex distinctly coarser and more-or-less regularly, longitudinally striate. Dorsum of mesosoma reticulate-punctate; sculpturation on mesonotum organised into rather uneven, longitudinal striae, curved obliquely towards lateral margins on propodeal dorsum. Sides of mesosoma, declivity and petiole reticulate-punctate. Spines sculptured at bases, smooth and polished towards tips. Gaster closely shagreened, opaque.

Mandibles with numerous, relatively short, curved hairs at masticatory and outer borders. Anterior clypeal margin medially with a few, anteriorly directed setae. Dorsa of

head, mesosoma and petiole with numerous, short, bristle-like, golden hairs, many fringing lateral and dorsal outline of head; appendages, including antennal scapes, with very short, erect hairs. Gaster with abundant, posteriorly inclined, marginally longer, golden hairs, distinctly longer around apex and on venter. Very sporadic, short, appressed, silvery pubescence in various densities over most body surfaces; pubescence golden and denser on dorsum of gaster but not hiding underlying sculpturation.

Black; mandibular masticatory borders and appendages dark to very dark reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis seducta* is somewhat similar to *P. melanura*. However, *P. seducta* can be distinguished by the distinctly deeper body sculpturation, more strongly posteriorly converging promesonotal lateral margins and short, bristle-like hairs on antennal scapes. *Polyrhachis seducta* is also very similar to *P. tanami* described below, with both having numerous short hairs on the antennal scapes and a distinctly swollen posterior face of the petiole. They differ mainly by the hairs on dorsum of mesosoma that are erect and very short in *P. seducta*, while they are longer and distinctly posteriorly directed in *P. tanami*.

*Polyrhachis seducta* is known only from Barrow Island. All specimens were collected foraging on the ground and it is highly probable that the species is a terrestrial nester like most other *Hagiomyrma* species.

*Polyrhachis (Hagiomyrma) semiobscura*  
Donisthorpe, 1944  
(Fig. 9A-B)

*Polyrhachis (Hagiomyrma) semiobscura* Donisthorpe, 1944:65. Holotype worker. Type locality: BISMARCK ARCHIPELAGO, NEW IRELAND, Kavieng (L.E. Cheesman), BMNH (examined).

*Polyrhachis semiobscura* Donisthorpe. Kohout & Taylor, 1990.

**Other Material.** INDONESIA, IRIAN JAYA: (as New Guinea: Neth.) Eramboe, 80 km ex Marauke, 5.ii.1960 (T.C. Maa) (w). PAPUA NEW GUINEA: Morobe Prov., Atzera Ra., Bubia Research Stn, 30-100 m, 06°40'S, 146°55'E, 23-26.viii.1984 (RJK acc. 84.357) (w); Northern Prov., Buna, 15.iii.1972 (PMR) (w);

Girua, 3.vii.1973 (PMR) (w). Central Prov., Varirata Rd, c. 500 m, 3 km WSW of Sogeri, 09°26'S, 147°23'E, 4.ix.1984 (RJK acc. 84.429) (w); Port Moresby, Boroko, 6-7.xi.1960 (J.L. Gressitt) (w). AUSTRALIA, QLD: Torres Strait, Saibai I., nr Saibai village, 09°23'S, 142°37'E, 10-21.vi.1975 (H&C) (w); Dauan I., nr Dauan village, 09°25'S, 142°32'E, 30-31.vii.1975 (H&C #DAU.6) (w); Mabulag (= Jarvis I.), 09°58'S, 142°11'E, 3.viii.1975 (H&C #MAB.1) (w); Wednesday I., 10°32'S, 142°19'E, 2-3.vii.1977 (E. Cameron) (w); Thursday I., 10°35'S, 142°13'E, 3.vii.1974 (H&C) (w); Horn I., 10°37'S, 142°17'E, 10-27.vi.1974 (H&C #HOR.23) (w); Gabba I., 09°46'S, 142°38'E, 30-31.vii.1975 (H&C) (w); Cape York, 10°41'S, 142°31'E, 25.iii.1987 (RJK acc. 87.85) (w); Cape York, Somerset, 10°45'S, 142°36'E, 7-12.vii.1976 (E. Cameron) (w); Cape York Pen., Weipa, MRRP study site N2a, v-vi.1995 (ANA) (w); Iron Ra., 12°43'S, 143°18'E, 26-31.vii.1981 (RJK accs 81.176, 179, 203) (w, ♀).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 7.00, 5.04-7.62; HL 1.71, 1.31-1.84; HW 1.51, 1.09-1.64; CI 88, 83-89; SL 1.91, 1.53-1.96; SI 126, 119-140; PW 1.28, 0.94-1.37; MW 0.68, 0.59-0.78; PMI 188, 151-188; MTL 2.12, 1.68-2.37 (1+9 measured).

Anterior clypeal margin with denticulate, median flange. Clypeus with distinct median carina; straight, or very weakly sinuate in profile with shallowly impressed basal margin. Frontal triangle poorly indicated. Frontal carinae sinuate with weakly raised margins. Sides of head in front of eyes weakly convex towards mandibular bases; behind eyes, sides rounding into convex occipital border. Eyes moderately convex, in full face view not or only marginally exceeding lateral cephalic outline. Ocelli lacking. Pronotum with humeri dilated (distinctly less dilated in Australian specimens), rounded, with lateral margins somewhat emarginate behind, subparallel or weakly converging into well impressed promesonotal suture. Mesonotum with lateral margins converging into medially indistinct, flat, metanotal groove. Propodeal spiracles situated on moderately projecting tubercles. Propodeal margins terminating in more-or-less horizontal, subparallel, acute spines with tips weakly curved outwards. Petiole with divergent, slender spines, weakly elevated in lateral view. Anterior face of first gastral segment higher than full height of petiole, widely rounding on dorsum.



Mandibles finely, longitudinally striate with piliferous pits. Head, mesosoma and petiole reticulate-punctate; vertex with more-or-less regular, rather distinct, longitudinal striae, extending anteriorly between eyes and frontal carinae and along sides of head; sculpturation rather smooth with distinctly polished appearance. Dorsum of mesosoma with reticulae more irregular and less distinct; spines finely sculptured along entire length. Gaster finely shagreened.

Mandibular masticatory borders with several curved, golden hairs and a few short, erect hairs along outer borders towards bases. Anterior clypeal margin medially with only a few, anteriorly directed setae. All body surfaces with rather short, mostly erect hairs, barely as long as half greatest diameter of eyes. Only a few, very short, bristle-like hairs lining leading edge of antennal scapes. Hairs distinctly longer and more posteriorly directed around apex and on venter of gaster. Closely appressed, mostly silvery or pale golden pubescence in various densities on head, mesosoma and petiole; pubescence distinctly more abundant and more golden on mesonotal and propodeal dorsa in Australian specimens. Gaster with somewhat longer, golden pubescence on dorsum, silvery on venter.

Black; mandibular teeth dark reddish-brown.

*Queen.* Dimensions: TL c. 8.06; HL 1.72; HW 1.43; CI 83; SL 1.81; SI 126; PW 1.62; MTL 2.12 (1 measured).

Apart from sexual characters very similar to worker, except: dorsum of mesoscutum wider than long with widely rounding anterior margin in dorsal view; flat in lateral view; median line bifurcate anteriorly; parapsides weakly raised. Mesoscutellum flat, not elevated above dorsal plane of mesosoma. Spines distinctly shorter than in worker. Sculpturation, pilosity, pubescence and colour similar to worker.

Male unknown. Immature stages present in the QM collection.

**Remarks.** *Polyrhachis semiobscura* is one of only four *Hagiomyrma* species originally described from specimens from outside the Australian

mainland, the others being *P. denticulata*, *P. metella* and *P. schenkii*. In *P. semiobscura*, Australian specimens have distinctly less dilated pronotal humeri and more abundant dorsal pubescence, notably on mesonotum and propodeum, compared to their New Guinean counterparts. However, considering their uniformity in other characters, such as the longitudinal striation of the head, the position of the propodeal spiracles on short, laterally projecting tubercles and the rather remarkable differences in the size of the workers (HL 1.31–1.84) from both populations, I am hesitant to consider them separate species. The known distribution of *P. semiobscura* ranges from New Ireland in the Bismarck Archipelago to Papua New Guinea and south across the Torres Strait islands as far as Iron Range on Cape York Peninsula. *Polyrhachis semiobscura* appears to be lignicolous in its nesting habit. The only known colony was found nesting in two adjacent galls attached to a twig of a small sapling in the open forest at Iron Range Nat. Park. At Varirata Range in Papua New Guinea numerous workers of *P. semiobscura* were collected from the rims of the pitchers of a species of *Nepenthes*. Despite the large numbers of workers and their rather busy activity around the rims, none were found trapped in the liquid at the bottom of the pitchers.

*Polyrhachis* (*Hagiomyrma*) *stricta* sp. nov.  
(Fig. 9C–D)

**Etymology.** Derived from the Latin *strictus*, meaning drawn together, tight, in reference to its distinctly posteriorly constricting promesonotal dorsum.

**Material.** HOLOTYPE: QLD, Porter Ck, 23 km SE of Cardwell, 18°26'S, 146°08'E, 26.ii.2000, *Melaleuca* swamp, R.J. Kohout acc. 2000.67, QMT174513 (worker). PARATYPE: data as for holotype (1 worker). Type distribution: Holotype in QM; paratype in ANIC.

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 6.35, 5.95; HL 1.65, 1.56; HW 1.31, 1.22; CI 79, 78; SL 1.84, 1.72; SI 140, 141; PW 1.12, 1.09; MW 0.59, 0.56; PMI 190, 195; MTL 2.03, 1.90 (2 measured).

Anterior clypeal margin with denticulate median flange. Clypeus with distinct median

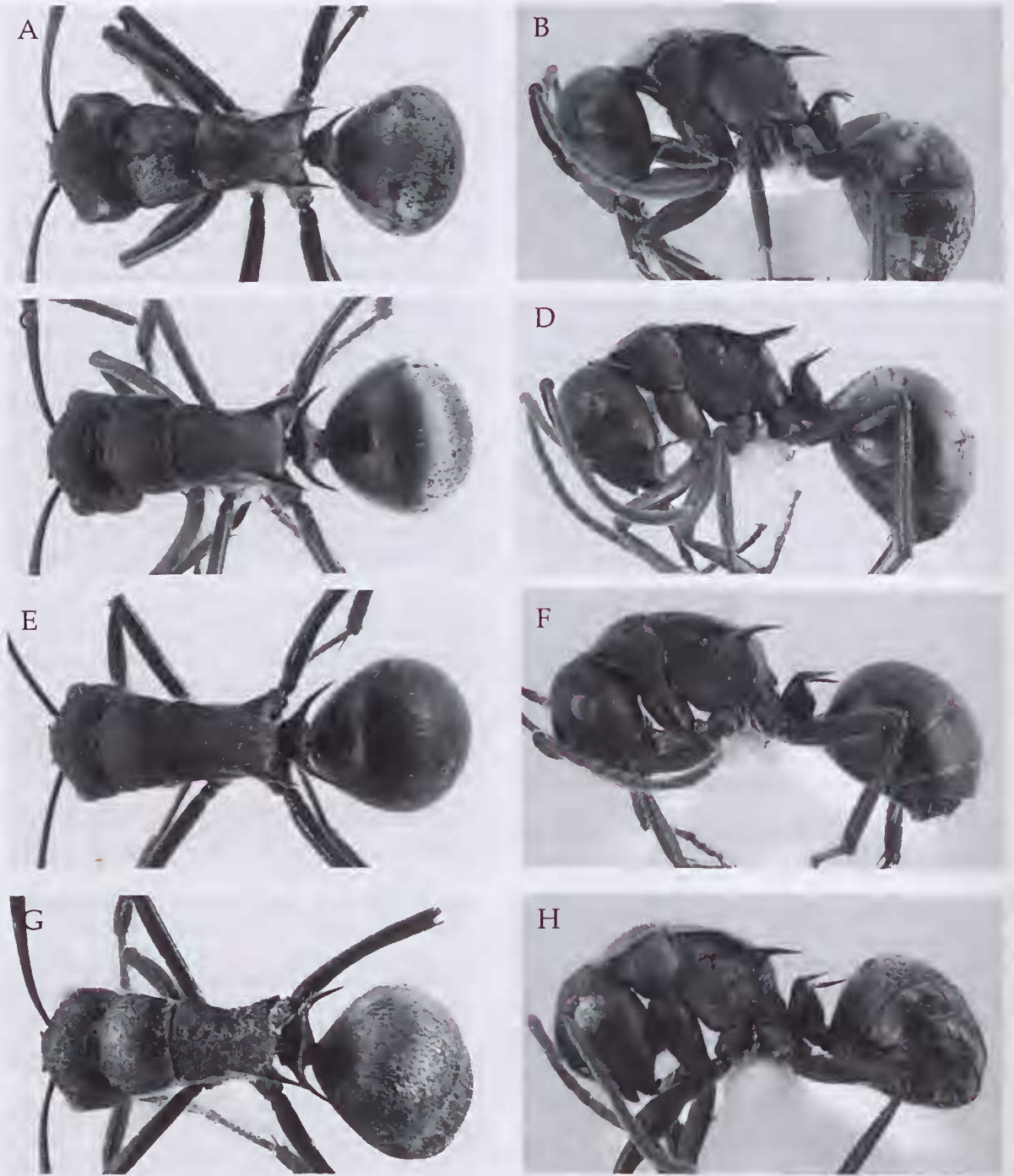


FIG. 9. *Polyrhachis* (*Hagiomyrma*) *penelope* species-group – dorsal (left) and lateral (right) view. A–B, *P. semiobscura* Donisthorpe; C–D, *P. stricta* sp. nov.; E–F, *P. tanami* sp. nov.; G–H, *P. tenebra* sp. nov. (not to scale).



carina; almost straight in profile with basal margin only very shallowly impressed. Frontal carinae sinuate with narrowly raised margins; central area with rather flat frontal furrow. Sides of head in front of eyes only weakly converging towards mandibular bases; behind eyes, sides widely rounding into convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Pronotal dorsum with humeri bluntly angular; promesonotal lateral margins narrowly raised, distinctly converging posteriorly. Promesonotal suture distinctly impressed; metanotal groove indicated by a notch in lateral margins, indistinct dorsally. Propodeal lateral margins terminating in distinctly divergent, weakly upturned, acute spines; dorsum descending into declivity in weakly convex line. Petiole with a pair of slender, divergent, upturned, acute spines. Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles finely striate with numerous piliferous pits. Head, mesosoma and petiole distinctly and closely, rather uniformly, reticulate-punctate. Gaster finely shagreened.

Mandibles at masticatory and outer borders with curved, golden hairs and closely appressed shorter hairs towards bases. Anterior clypeal margin with several longer setae medially and fringe of shorter setae laterally. Numerous, mostly erect hairs on clypeus and along frontal carinae; distinctly shorter hairs on sides of head and vertex. Dorsum of mesosoma with numerous erect or suberect hairs, hairs on propodeum half as long as greatest diameter of eye. Gaster dorsally and ventrally with numerous posteriorly directed, relatively long, golden hairs. Rather sparse pale golden or silvery, closely appressed pubescence on head and mesosoma, more abundant on meso- and metapleura, propodeal declivity and petiole. Gastral dorsum with rich golden pubescence almost hiding underlying sculpturation; pubescence silvery and less abundant on gastral venter.

Black; mandibles, clypeal flange (except narrow anterior margin), antennae, pronotal

collar, legs, including coxae, light to medium reddish-brown; tibiae and gastral venter distinctly darker reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis stricta* is known only from two specimens found foraging on the ground and low vegetation at the type locality. *Polyrhachis stricta* somewhat resembles *P. placida* as they have similar colour patterns. However, the clypeus in *P. stricta* is almost straight in lateral view with the basal margin only shallowly impressed, while in *P. placida* the profile of the clypeus is distinctly sinuate and the basal margin deeper. The promesonotal lateral margins in *P. stricta* are strongly converging posteriorly (PMI >190) with the propodeal spines weakly upturned. In contrast, in *P. placida* the promesonotal margins converge less strongly (PMI <168) and the propodeal spines curve downwards from their midlength. The pilosity in *P. placida* is also distinctly longer and mostly silvery with the pubescence somewhat less tidy, notably over the gastral dorsum. *Polyrhachis stricta* and *P. placida* were both listed earlier as '*Hagio 17*' by Kohout (2000: 200).

*Polyrhachis* (*Hagiomyrma*) *tanami* sp. nov.  
(Fig. 9E-F)

**Etymology.** From the type locality, the Tanami Desert in the Northern Territory.

**Material.** HOLOTYPE: NT, Central Tanami Desert, 152 km E of Lajamanu, 19°03'S, 131°51'E, 26.vii.2001, A.L. Hertog (worker). PARATYPE: data as for holotype (1 worker). Type distribution: Holotype in ANIC; paratype in QM.

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 6.10, 6.65; HL 1.59, 1.59; HW 1.22, 1.28; CI 77, 80; SL 1.87, 1.87; SI 153, 146; PW 1.15, 1.18; MW 0.65, 0.67; PMI 177, 176; MTL 2.03, 2.09 (2 measured).

Anterior clypeal margin with shallow, denticulate, median flange. Clypeus with distinct median carina; almost straight in profile, posteriorly rounding into shallowly impressed basal margin. Frontal carinae sinuate, with only weakly and narrowly raised margins. Sides of head converging towards mandibular bases in virtually straight line; behind eyes, sides

rounding into convex occipital margin. Eyes convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri rounded with narrowly raised margins; lateral margins converging towards well impressed promesonotal suture. Mesonotum with margins converging towards poorly indicated metanotal groove. Propodeal dorsum armed with slender, horizontal, divergent spines, weakly curved outwards and downwards from midlength. Petiolar spines widely divergent, raised obliquely from bases, continued horizontally towards weakly upturned tips. Anterior face of first gastral tergite widely rounding onto dorsum.

Mandibles very finely, closely, longitudinally striate with piliferous pits. Head, mesosoma and petiole very distinctly, rather coarsely reticulate-punctate; sculpturation on vertex distinctly, mostly longitudinally striate. Sculpturation less coarse on dorsum of mesosoma, pronotal sculpture consisting of somewhat irregular, anteriorly converging, rather flat striae. Gaster shagreened; sculpturation on dorsum more distinct with numerous shallow pits.

Mandibular masticatory and outer borders with numerous, curved, golden hairs, hairs suberect towards bases. Anterior clypeal margin with a few longer setae medially and fringe of shorter setae laterally. Most body surfaces, including appendages, with numerous, short to medium length, mostly erect hairs; gaster with hairs marginally longer and more posteriorly directed. Very diluted short, silvery, closely appressed pubescence on head, mesosoma and petiole; pubescence somewhat more abundant and golden on dorsum of gaster.

Black; mandibles reddish-brown. Appendages black or very dark reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis tanami* is characterised by its small size and distinctly and rather deeply sculptured body. It is relatively similar to *P. tenebra*, with which it shares rather strongly posteriorly converging margins of the promesonotal dorsum (PMI 176-177 in *P. tanami* versus 172 in *P. tenebra*) and virtually

identically shaped petiolar spines. However, *P. tenebra* has the dorsum of the head and mesosoma more finely reticulate-punctate with the sculpture on the anterior pronotum, including the humeri, and most of mesonotum and propodeum partially hidden by relatively long, appressed, pale golden pubescence. *Polyrhachis tanami* is known only from a single locality in the Tanami Desert and nothing is known of its nesting habits.

*Polyrhachis (Hagiomyrma) tenebra* sp. nov.  
(Fig. 9G-H)

**Etymology.** Derived from the Latin *tenebrosus*, meaning dark, darkness, in reference to its virtually black appearance.

**Material.** HOLOTYPE: QLD, 5 km E of Pentland (20°32'S, 145°24'E) 3.i.1977, B.B. Lowery (worker). Type deposition: Unique holotype in ANIC.

**Description.** *Worker.* Dimensions: TL c. 6.35; HL 1.62; HW 1.31; CI 81; SL 1.75; SI 133; PW 1.12; MW 0.65; PMI 172; MTL 2.00.

Anterior clypeal margin with shallow, acutely denticulate, median flange. Clypeus with median carina; almost straight in profile, weakly elevated posteriorly; basal margin very shallowly impressed. Frontal carinae sinuate, with narrowly raised margins. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes, sides rounding into convex occipital margin. Eyes convex, in full face view marginally exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri rounded with narrowly raised anterior margins; promesonotal suture distinct. Mesonotum with margins converging towards poorly indicated metanotal groove. Propodeal dorsum armed with slender, horizontal, divergent spines, with tips weakly curved outwards. Petiolar spines widely divergent, obliquely elevated from bases and continued horizontally towards weakly upturned tips. Anterior face of first gastral tergite widely rounding onto dorsum.

Mandibles finely, longitudinally striate with piliferous pits. Head, mesosoma and petiole reticulate-punctate with sculpturation relatively fine and uniform. Spines sculptured



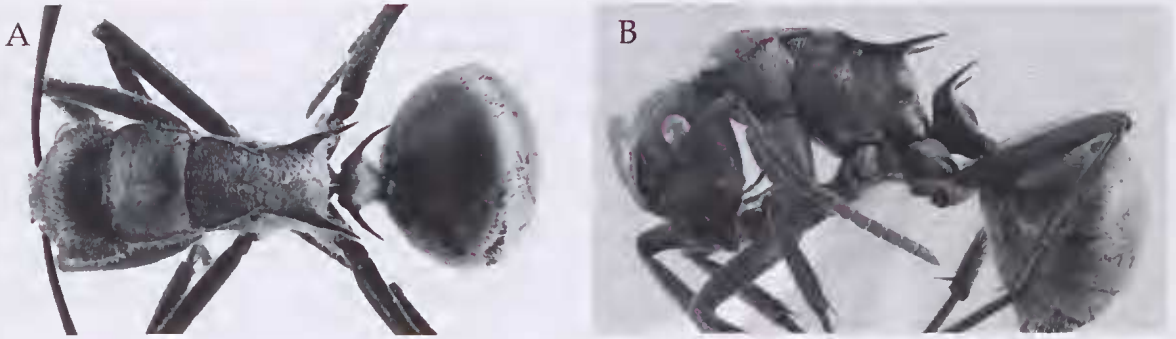


FIG. 10. *Polyrhachis* (*Hagiomyrma*) *penelope* species-group – dorsal (left) and lateral (right) view. A-B, *P. weiri* sp. nov. (not to scale).

at bases, smooth and polished towards tips. Gaster shagreened.

Mandibular masticatory and outer borders with numerous, curved, golden hairs; hairs shorter and suberect towards bases. Anterior clypeal margin with a few longer setae medially and fringe of shorter setae laterally. Most body surfaces, including appendages, with numerous, rather short, golden hairs; marginally longer and variously directed hairs on dorsum of mesosoma. Gaster with posteriorly directed hairs on dorsum; somewhat longer hairs on apical segments and venter. Mostly silvery, closely appressed pubescence on head, mesosoma and petiole; pubescence distinct, somewhat longer and pale golden on anterior portion of pronotal dorsum, including humeri. Gastral dorsum with rather abundant, golden pubescence, almost hiding underlying sculpturation; much diluted, silvery pubescence on gastral venter.

Black; mandibles reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis tenebra* is somewhat similar to *P. tananii* with their differences discussed in remarks section of the latter species. The unique holotype of *P. tenebra* was collected foraging on the ground in savannah woodland. Like most other *Hagiomyrma* species inhabiting this kind of habitat, it is most likely a ground-nesting species.

*Polyrhachis* (*Hagiomyrma*) *weiri* sp. nov.  
(Fig. 10A-B)

**Etymology.** After the collector of the type series specimens, Tom Weir of the ANIC of the Ecosystem Sciences, Canberra.

**Material.** HOLOTYPE: NT, Wessel Is, Rimbija I., 11°01'S, 136°45'E, 3-14.ii.1977, T.A. Weir acc. 77.7 (worker). PARATYPES: data as for holotype (5 workers); Wessel Is, Marchinbar I., 11°09'S, 136°42'E, vii.1993, sandstone slope, CCNT Survey M3/4 (2 workers); Wessel Is, Emu I., ix.1994, S. Morrison (3 workers); Rainbow Cliff nr Nhulunbuy, 12°12'S, 136°49'E, 1.v.2004, B. Hoffmann (worker). Type deposition: Holotype and 2 paratypes in ANIC; 2 paratypes each in BMNH, MCZC and QM; 1 paratype each in CASC, MHNG and WAMP.

**Other Material.** WA: Kimberley region, Cathedral NP, ix.1993 (S. Morrison) (w).

**Description.** *Worker:* Dimensions (holotype cited first): TL c. 6.85, 5.59-7.36; HL 1.75, 1.40-1.78; HW 1.34, 1.06-1.34; CI 76, 74-76; SL 2.09, 1.72-2.12; SI 156, 154-166; PW 1.22, 0.90-1.22; MW 0.53, 0.37-0.53; PMI 230, 212-259; MTL 2.34, 1.77-2.34 (13 measured).

Anterior clypeal margin with denticulate, median flange. Clypeus sinuate in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle poorly indicated. Frontal carinae sinuate with narrowly raised margins; central area relatively wide with distinct frontal furrow. Sides of head in front of eyes moderately convex towards mandibular bases; behind eyes, sides widely rounding into convex occipital margin. Eyes convex, in full face view exceeding lateral cephalic outline.

Ocelli lacking. Pronotal dorsum with humeri rounded; lateral margins converging towards distinctly impressed promesonotal suture. Mesonotum with margins strongly converging posteriorly; metanotal groove only weakly impressed. Propodeal margins terminating in rather slender, horizontal, divergent spines with tips weakly turned outwards. Petiole with anterior face straight, rounding dorsally into very slender, distinctly obliquely raised, divergent spines; posterior face of petiole distinctly swollen towards base.

Mandibles finely, longitudinally striate with numerous piliferous pits. Head and mesosoma closely reticulate-punctate; spines sculptured at bases, smooth and polished towards tips. Gaster finely shagreened.

Mandibles at mastitatory borders with numerous, curved, pale golden hairs and short, more appressed hairs towards bases. Anterior clypeal margin with several anteriorly projecting longer setae medially and fringe of short setae lining margin laterally. Head, including clypeus, mesosoma, petiole, gaster and appenages with numerous, mostly erect, relatively short hairs; head in full face view with numerous short hairs breaking lateral cephalic outline; antennal scapes with numerous, very short, semierect, bristle-like hairs. Gastral dorsum with abundant, somewhat longer, semierect, pale golden hairs; hairs distinctly longer and posteriorly directed on venter and around apex of gaster. Silvery, appressed pubescence in various densities over most of head and body surfaces; pubescence more pale golden on dorsum of first gastral tergite and somewhat laterally diffused into more silvery towards sides and on venter.

Vertex of head, dorsum of mesosoma, petiole, dorsum of gaster and spines, black; mandibles, front, sides and venter of head, sides of pronotum, venter of gaster and appendages medium to dark reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis weiri* is characterised by the strongly posteriorly converging lateral margins of the promesonotum (PMI ca. 250).

*Polyrhachis weiri* is apparently restricted to the extreme north of the Northern Territory, including its adjacent islands, and to the Kimberley region of Western Australia. Nothing is known about the species' biology, but as the type series specimens were collected foraging on the ground it is reasonable to suggest that their nesting habit is terrestrial or subterranean.

#### *POLYRHACHIS (HAGIOMYRMA) SCHENKII* SPECIES-GROUP

#### *Polyrhachis (Hagiomyrma) bohemia* sp. nov. (Fig. 11A-B)

**Etymology.** After the type locality, Bohemia Downs, in the southern Kimberley region.

**Material.** HOLOTYPE: WA, Bohemia Downs Stn, 18°53'S, 126°14'E, v.2001, C. Palmer (worker). PARATYPES: data as for holotype (2 workers); Karijini NP, Fortescue Falls, 22°28'S, 118°33'E, 22.ix.1998, A.N. Andersen (worker). NT, 45 km NW of Katherine, 7.iv.1978, P.J.M. Greenslade (worker); Tanami Desert, 20.v.1986, P.J.M. Greenslade (worker); Bunda Stn, Victoria R. distr., v.1994, A.J. Fisher (1 dealate queen). QLD, Texas Cattle Stn, c. 30 km NNW of Jericho, vi.1999, K. Schneider #3/00 (2 workers); nr Alpha, Desert Uplands, v.2007, J. Bennett (1 worker). Type deposition: Holotype and 1 paratype in ANIC; 2 paratypes in QM; 1 paratype each in BMNH, MCZC and WAMP.

**Other Material.** WA: Pilbara region, 24.4 km S of Tom Price, Nanutarra-Wittendom Rd., 22°46'S, 117°30'E, 5.vi.2004 (M. Bulbert, N. Tartarnic & S. Lassau) (w); Ethel Ck, ii.1996 (F.K. Singarayar) (w); Barlee Ra., ix.1995 (S. van Leeuwen) (w) (CURT-JDM #900).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 6.65, 6.65-7.56; HL 1.62, 1.59-1.81; HW 1.27, 1.27-1.47; CI 78, 78-81; SL 1.93, 1.87-2.03; SI 152, 138-152; PW 1.22, 1.15-1.43; MW 0.72, 0.64-0.84; PMI 169, 155-181; MTL 2.28, 2.21-2.43 (9 measured).

Median flange of anterior clypeal margin with acute teeth medially, laterally delimited by acute angles. Clypeus with median, rather acute longitudinal carina; straight in profile. Frontal carinae with moderately raised margins; central area relatively wide with blunt, weakly elevated longitudinal carina. Sides of head in front of eyes weakly convex towards mandibular bases; behind eyes, sides rounding into convex





*POLYRHACHIS (HAGIOMYRMA) SCHENKII SPECIES GROUP*

- Map 1 ● *P. bohemia* ▼ *P. capeyorkensis* □ *P. isolata* × *P. injinooi*  
 Map 2 ● *P. lachesis*  
 Map 3 ● *P. schenkii*  
 Map 4 ● *P. lydiae* ▼ *P. paxilla*

occipital margin. Eyes convex, clearly breaking lateral cephalic outline in full face view. Ocelli lacking. Pronotal dorsum distinctly wider than long; humeri widely rounded, weakly concave dorsally with moderately raised margins; lateral margins virtually parallel. Mesonotum with lateral margins weakly converging posteriorly; metanotal groove indistinct dorsally. Propodeal lateral margins divergent, terminating in mostly horizontal, subparallel, acute spines with tips weakly turned outwards in some specimens. Petiole with posterior face distinctly inflated towards base; dorsum armed with pair of horizontal, posteriorly curved, divergent spines.

Mandibles finely longitudinally striate with piliferous pits towards bases. Head, mesosoma and gaster closely reticulate-punctate. Spines distally smooth and highly polished.

Mandibles with medium length, curved, golden hairs near masticatory borders. Only a few, relatively short setae fringing anterior clypeal margin. Numerous relatively long, erect or variously curved, golden hairs arising from all dorsal body surfaces, some hairs almost as long as greatest diameter of eyes. Pale golden and silvery appressed pubescence in various densities over most of body; pubescence most dense and longest on gaster, with rich golden hue dorsally, silvery on gastral venter.

Head and mesosoma light to medium red; gaster distinctly darker, reddish-brown. Mandibular teeth dark brown, legs light to medium brown. Anterior clypeal margin, frontal carinae, lateral margins of mesosoma and spines narrowly bordered with brown.

*Queen.* Dimensions: TL 7.96; HL 1.78; HW 1.43; CI 80; SL 1.87; SI 131; PW 1.68; MTL 2.31 (1 measured).

Apart from sexual characters very similar to worker, except: pronotal humeri subangular. Mesoscutum almost as long as wide, anterior margin evenly rounded; dorsum flat in lateral view; median line distinct, parapsides rather flat; mesoscutellum flat, only marginally raised above dorsal plane of mesosoma. Propodeal spines distinctly shorter than in worker,

horizontal and parallel; propodeal dorsum sloping posteriorly into steeply oblique declivity. Sculpturation similar to worker, sides of mesoscutum and mesoscutellum distinctly finer, almost polished. Pubescence, pilosity and colour scheme virtually as in worker.

Male and immature stages unknown.

**Remarks.** With its bright red head and mesosoma and dark reddish-brown gaster, *P. bohemia* is a very characteristic and easily recognised species. Despite of its wide distribution across arid and semi-arid regions of northern tropical Australia, it appears to be rare. Like most other *Hagiomyrma* species, it nests in the ground.

*Polyrhachis (Hagiomyrma) capeyorkensis* sp. nov.  
(Fig. 11C-D)

**Etymology.** After the type locality Cape York Peninsula in Queensland.

**Material.** HOLOTYPE: QLD, Cape York Pen., Embley Ra. (Nth end), Rock Slab Hill, 24.x.1958, J.L. Wassell #381 (worker). PARATYPES: data as for holotype (15 workers). Type deposition: Holotype and 5 paratypes in ANIC; 4 paratypes in QM, 2 paratypes each in BMNH, MCZC and MHNG.

**Description.** *Worker:* Dimensions (holotype cited first): TL c. 7.31, 6.50-7.81; HL 1.78, 1.65-1.90; HW 1.47, 1.31-1.59; CI 82, 78-84; SL 2.03, 1.89-2.12; SI 138, 131-149; PW 1.31, 1.12-1.37; MW 0.75, 0.64-0.78; PMI 175, 175-184; MTL 2.40, 2.18-2.50 (16 measured).

Anterior clypeal margin with denticulate flange medially, flanked by acute denticles. Clypeus with distinctly raised median carina; sinuate in profile; basal margin moderately impressed. Frontal triangle distinct. Frontal carinae sinuate with weakly raised margins; central area rather flat with distinct frontal furrow. Sides of head in front of eyes only weakly convex, rounding into mandibular bases; behind eyes, sides widely rounding into convex occipital border. Eyes marginally exceeding lateral cephalic outline in full face view. Ocelli lacking. Pronotal humeri narrowly rounded with weakly raised margins. Promesonotal dorsum with lateral margins



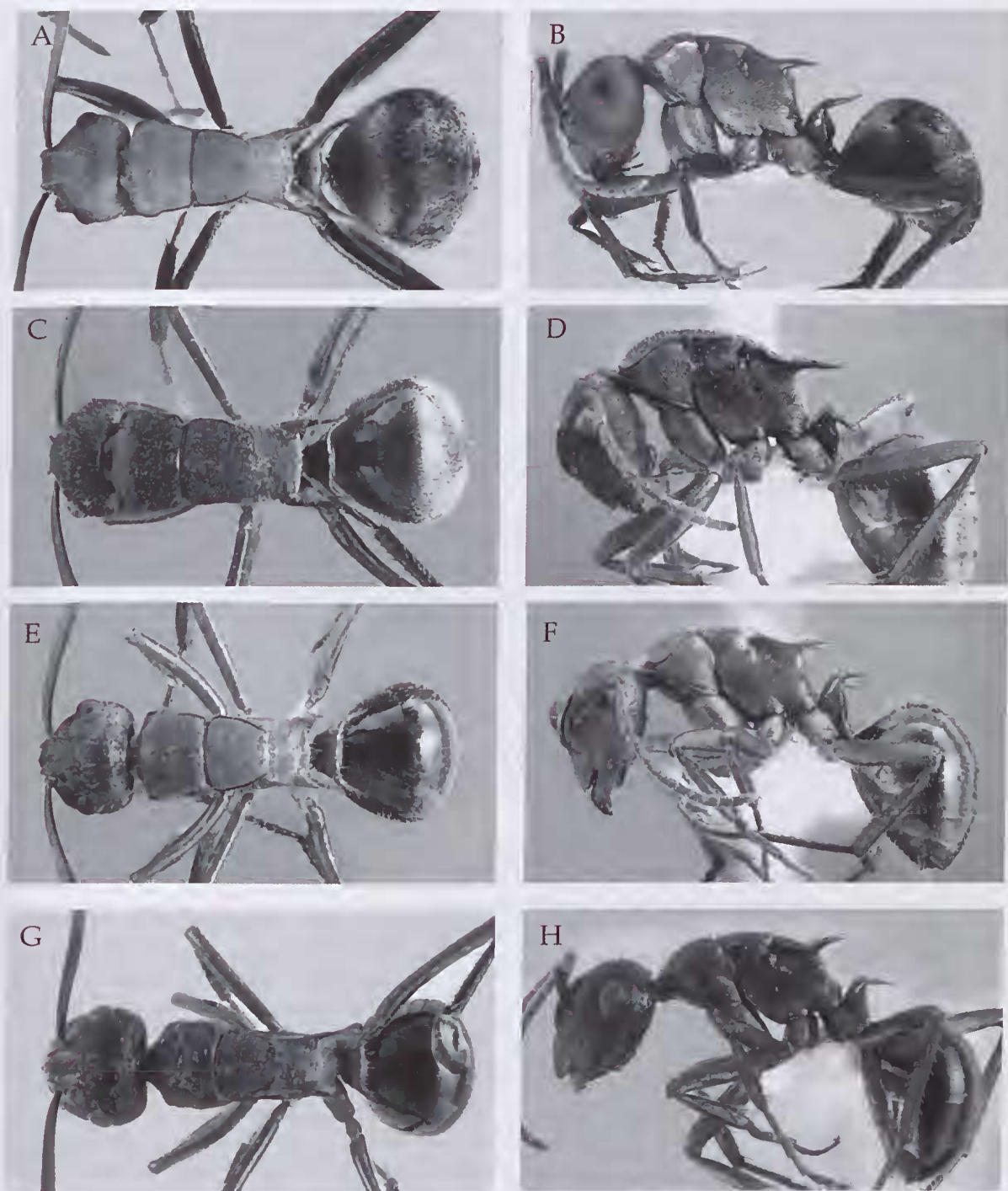


FIG. 11. *Polyrhachis* (*Hagiomyrma*) *schenkii* species-group - dorsal (left) and lateral (right) view. A-B, *P. bohemia* sp. nov.; C-D, *P. capeyorkensis* sp. nov.; E-F, *P. injinooi* sp. nov.; G-H, *P. isolata* sp. nov. (not to scale).

converging posteriorly into medially indistinct metanotal groove. Propodeal dorsum with margins weakly divergent, terminating in horizontal, subparallel, acute spines. Petiole with anterior face straight, posterior face convex, laterally bordered with distinct carina; dorsum with shallow notch medially, armed laterally with pair of divergent, weakly downturned, acute spines. Anterior face of first gastral segment higher than full height of petiole, straight, widely rounding onto dorsum.

Mandibles very finely longitudinally striate. Head and mesosoma very closely reticulate-punctate. Petiole and gaster finely shagreened, rather smooth and polished.

Mandibles with medium length, curved hairs at masticatory borders and shorter hairs along outer borders. Anterior clypeal margin with a few longer setae medially and fringe of shorter setae lining margin laterally. Short to medium length, erect, bristle-like hairs abundant over whole body, including appendages, with distinctly longer, more posteriorly directed hairs on gaster. Rather untidy, relatively long, appressed and semierect pubescence variously distributed over most body surfaces, more abundant and somewhat medially radiating on dorsum of gaster, where it forms a poorly defined midline.

Relatively dark, reddish-brown or rusty red with mandibles, clypeus, central area, anterior portion of pronotum, gaster and appendages distinctly lighter.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis capeyorkensis* is similar to several species, but most notably to *P. lachesis*, which is also a characteristic reddish-brown colour and clothed with bristle-like hairs. It differs by its generally smaller size (HL 1.65–1.90 in *P. capeyorkensis* versus 1.84–1.96 in *P. lachesis*), the form of its pronotal humeri which lack distinctly dilated, rounded prominences and the vertical carina running along the lateral margin of the posterior face of the petiole that is lacking in *P. lachesis*.

*Polyrhachis (Hagiomyrma) injinooi* sp. nov.  
(Fig. 11E–F)

**Etymology.** After the Injinoo Aboriginal Community, the traditional owners of the land on which the type locality of *P. injinooi* is located.

**Material.** HOLOTYPE: QLD, Cape York Pen., Bamaga, 10°53'S, 142°23'E, 24.iii.1987, R.K. Kohout acc. 87.80, QMT174514 (worker). PARATYPES: data as for holotype (44 workers). Type deposition: Holotype and most paratypes in QM; 2 paratypes each in ANIC, BMNH, CASC, MCZC, MHNG and MNHU.

**Other Material.** QLD: Cape York Pen., Leo Kitchen Camp, 17.x.1958 (J.L. Wassell) (1 w); 3 km SE of Annan R. x-ing, 15°33'S, 145°14'E, c. 40 m, 10.vi.1996 (RJK acc. 96.35) (4 w).

**Description.** *Worker:* Dimensions (holotype cited first): TL c. 7.11, 5.74–7.16; HL 1.75, 1.53–1.75; HW 1.36, 1.15–1.36; CI 78, 75–85; SL 1.87, 1.65–1.87; SI 137, 134–143; PW 1.17, 0.97–1.20; MW 0.56, 0.50–0.59; PMI 209, 190–209; MTL 2.25, 1.87–2.25 (15 measured).

Anterior clypeal margin with median denticulate flange, flanked by acute angles. Clypeus with distinctly raised median carina; virtually straight in profile (medially shallowly concave in some specimens), narrowly rounding into moderately impressed basal margin. Frontal triangle poorly indicated. Frontal carinae sinuate with weakly raised margins; central area flat with frontal furrow replaced anteriorly by distinct carina. Sides of head in front of eyes converging towards mandibular bases in virtually straight line; behind eyes, sides widely rounding into convex occipital margin. Eyes convex, in full face view marginally breaking lateral cephalic outline. Ocelli lacking; position of median ocellus indicated by shallow pit in cephalic sculpture. Antennal scapes distinctly flattened dorsally for most of length. Pronotal humeri narrowly rounded with indication of blunt angles in some specimens. Lateral margins of promesonotal dorsum narrowly raised, strongly converging posteriorly (PMI 190–209). Metanotal groove poorly defined medially. Propodeal dorsum with lateral margins divergent, terminating in weakly sinuate, acute spines. Anterior face of petiole straight, posterior face descending towards base in oblique, straight line; dorsum



concave medially, laterally rounding into horizontal, divergent, acute spines, with tips weakly curved outwards.

Head and mesosoma finely reticulate-punctate, with interspaces between reticulae, notably on dorsum of mesosoma, rather smooth and polished; spines, petiole and gaster very smooth, highly polished.

Mandibles with masticatory and outer borders with curved, rather short, golden hairs. Anterior clypeal margin with a few longer setae medially and fringe of short setae lining margin laterally. Antennal scapes and legs with numerous short, bristle-like hairs. Head, mesosoma, petiole and gaster with relatively long, mostly erect or suberect hairs, longest hairs more than half greatest diameter of eyes. Pubescence absent from most body surfaces, except for patches of short, closely appressed hairs on fore coxae, propodeal declivity and posterior face of petiole. Gaster with more abundant, somewhat longer, appressed pubescence on venter, very sparse on dorsum.

Reddish-brown to rusty-red. Mandibles, anterior clypeal margin, frontal carinae, occipital margin, lateral margins of mesosoma and outer borders of spines narrowly lined with black. Gaster and tarsi a shade darker.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis injinooi* is very similar to *P. schenkii* and in addition to their virtually identical colour patterns, they both have a strongly posteriorly narrowed pro-mesonotal dorsum (PMI 190-209 in *P. injinooi* and 210-250 in *P. schenkii*). However, *Polyrhachis injinooi* is generally larger (HL 1.53-1.75 versus 1.31-1.56 in *P. schenkii*) and has somewhat flattened antennal scapes, distinctly longer body hairs and very sparse, closely appressed pubescence on the dorsum of gaster. In contrast, *P. schenkii* has antennal scapes that are virtually circular in cross section, distinctly shorter, bristle-like hairs and silvery or golden, appressed pubescence on the gastral dorsum. The eyes are also distinctly smaller in *P. injinooi* than in *P. schenkii*.

All known specimens of *P. injinooi* were collected foraging on the ground in open forest and savannah woodland, together with specimens of *P. schenkii*. Both species have similar nesting habits, building nests in the ground with the entrances hidden under pieces of wood or stones. However, the distribution of *P. injinooi* is much more restricted than that of *P. schenkii*, with the species known only from Cape York Peninsula as far south as Cooktown.

*Polyrhachis* (*Hagiomyrma*) *isolata* sp. nov.  
(Fig. 11G-H)

**Etymology.** Derived from the neo-Latin word *isolatus*, meaning detached in reference to the species rather isolated occurrence on North Islet, West Island.

**Material.** HOLOTYPE: NT, North Islet, West I., Sir Edward Pellew Group, 15°32'S, 136°31'E, 20.iv.1976, J.E. Feehan (worker). Unique holotype in ANIC.

**Description.** *Worker*: Dimensions of holotype: TL c. 6.40; HL 1.72; HW 1.40; CI 81; SL 1.72; SI 123; PW 1.06; MW 0.53; PMI 200; MTL 2.03.

Mandibles with 5 blunt teeth of equal length. Anterior clypeal margin with median, denticulate flange. Clypeus with very strongly raised median carina; virtually straight in profile, posteriorly rounding into well impressed basal margin. Frontal triangle indistinct. Frontal carinae sinuate with moderately raised margins; central area relatively wide, with distinctly anteriorly raised, longitudinal ridge replacing frontal furrow. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes, sides widely rounding into convex occipital border. Eyes convex, clearly exceeding lateral cephalic outline in full face view. Ocelli lacking. Pronotal humeri only narrowly rounded with indication of blunt angles; pronotal dorsum widest just behind humeri; promesonotal suture distinct. Mesonotal lateral margins distinctly converging into laterally distinct, medially somewhat obscure metanotal groove. Propodeum with subparallel lateral margins terminating in sinuate, acute spines with tips curved outwards. Petiole armed with very slender, divergent, acute spines; posterior face of petiole obliquely descending towards base

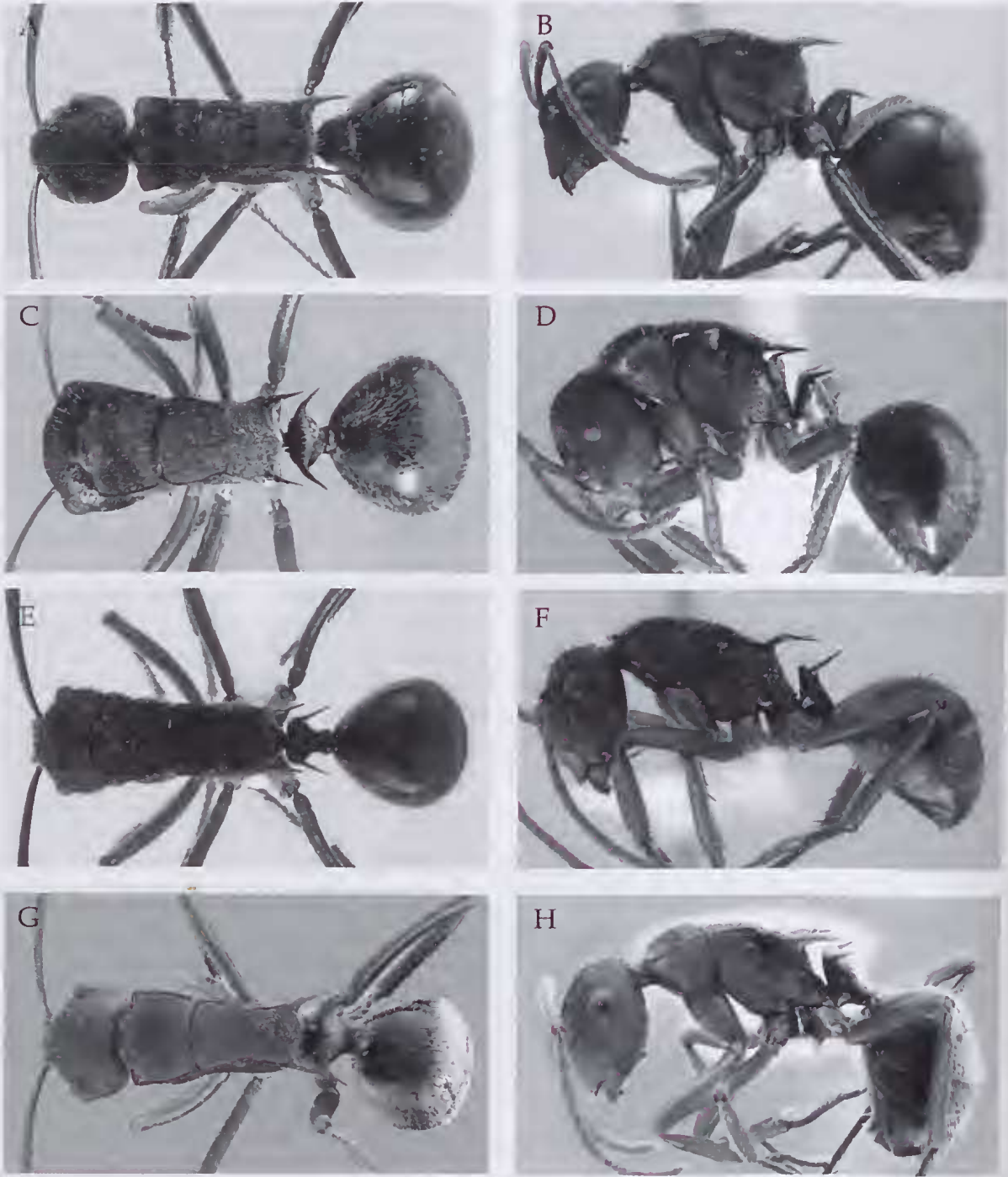


FIG. 12. *Polyrhachis* (*Hagiomyrma*) *schenkii* species-group – dorsal (left) and lateral (right) view. A–B, *P. lachesis* Forel; C–D, *P. lydiae* Forel; E–F, *P. paxilla* Fr. Smith; G–H, *P. schenkii* Forel (not to scale).



in straight line. Anterior face of first gastral tergite straight at base, rounding onto dorsum.

Mandibles at bases with very fine, rather flat, longitudinal striae and a few, shallow pits, rather polished towards masticatory borders. Clypeus reticulate-punctate, sculpture somewhat wrinkled and obliquely directed towards median carina. Head reticulate-punctate, reticulae more longitudinally organised on sides and between eyes and frontal carinae. Sculpturation on vertex of head and mesosomal dorsum forming rather irregular, more-or-less vermiculate pattern that is superimposed over irregularly spaced, shallow punctures, giving dorsum somewhat polished appearance. Sides of mesosoma and posterior face of petiole reticulate; spines, anterior face and dorsum of petiole rather smooth and polished; gaster highly polished.

Mandibles with a few, relatively short, golden hairs. Anterior clypeal margin with several, very short setae medially and laterally. Head, mesosoma and petiole with numerous, bristle-like, short and medium length hairs, many hairs fringing lateral outline of head; appendages, including antennal scapes, with very short to medium length, erect hairs. Gaster with abundant, posteriorly inclined, golden hairs, longest more than half greatest diameter of eyes. Very sporadic, short, appressed pubescence on sides of mesosoma, petiole, coxae and venter of gaster; pubescence virtually absent from all dorsal surfaces.

Distinctly light to medium reddish-brown; mandibular teeth and outer borders, anterior and basal margins of clypeus, frontal carinae, occipital margin, pronotal, mesonotal and mesopleural margins very narrowly lined with black.

Sexuals and immature stages unknown.

**Remarks.** With its distinct reddish-brown colour scheme and short, bristle-like pilosity, *P. isolata* resembles *P. lachesis* and *P. schenkii*. It differs from both in the outline of the pronotal humeri, the orientation of the propodeal spines and the body sculpturation. In *P. isolata* the lateral pronotal margins are narrowly rounded

with the humeri indicated by poorly defined blunt angles, and the pronotal dorsum widest near its midlength. The pronotal dorsum in both other species is distinctly widest across the humeri, with the lateral pronotal margins strongly posteriorly converging. In *P. lachesis*, the humeri are produced into distinctly dilated, rounded, dorsally shallowly concave prominences, while in *P. schenkii* the humeri are bluntly angular. In *P. isolata*, the propodeal spines in profile are oblique to the main axis of the body, while in the other two species they are more-or-less horizontal. The sculpturation of the head and mesosomal dorsum consists of a relatively fine, somewhat vermiculate-rugose pattern, superimposed over irregularly spaced, shallow and rather polished punctures. In both the other species the head and body are finely reticulate-punctate. The gaster in *P. isolata* and *P. lachesis* is very smooth, highly polished, while in *P. schenkii* the gastral dorsum is finely shagreened with relatively abundant, closely appressed pubescence.

### *Polyrhachis* (*Hagiomyrma*) *lachesis* Forel, 1897 (Fig. 12A-B)

*Polyrhachis lachesis* Forel (in Emery), 1897:582 (footnote).

Syntype workers. Type locality: QLD, Mackay (G. Turner), MHNG, QM (examined).

*Polyrhachis lachesis* Forel. Emery, 1925:185 (combination in *P. (Hagiomyrma)*).

**Other Material.** QLD: Lakefield NP, 14°59'S, 144°15'E, 19-29.vi.1980 (RJK acc. 80.36) (w); ditto, White Lily Lagoon, 14 km N Lakefield, 19.vii.2002 (ANA) (w); Atherton (E.H. Bourne) (w); Archer Ck, nr Ravenshoe, 23.v.1935 (T. Greaves) (q); Undara Lava Lodge, 8.vii.2002 (ANA) (w); 14 km E of Mingela, 5.i.1977 (BBL) (w); Townsville, 18.x.1902 (F.P. Dodd) (w); Mt Elliot NP, Alligator Ck, 19°26'S, 146°57'E, 11.vi.1987 (RJK acc. 87.94) (w); Proserpine, Airport Drive, 20°29'17"S, 148°33'55"E, 7.xi.2007 (CJB) (w); Mt Blackwood NP, 21°02'S, 148°56'E, 14.iv.1981 (RJK acc. 81.100) (w); Surprise Ck, Mt Ossa-Seaforth Rd, 20°56'S, 148°53'E, 15.iv.1981 (RJK acc. 81.114) (w); Sarina Beach, 20 mi S of Mackay, 19.xii.1972 (BBL) (w); Britton Ra., 6 km NNE of Homevale, 21°23'S, 148°33'E, 1-6.iv.1975 (RJK accs 75.159, 160, 165) (w); Lords Table, W base, 22°39'35"S, 148°0'27"E, 8.iii.2006 (GBM) (w); 6 km N of Mt Archer, nr Rockhampton, 23°17'S, 150°34'E, 4.i.1979 (RJK acc. 79.18) (w); Rundle Ra., 36 km NW of Gladstone, 23°39'S, 150°58'E, 24-30.iii.1975 (RJK acc. 75.116, 143) (w); Callide Dam, nr Biloa, 19.xii.1972 (BBL) (w).

**Description.** *Worker.* Dimensions (syntypes cited first): TL c. 7.56-7.96, 7.06-8.21; HL 1.87-1.90, 1.84-1.96; HW 1.43-1.47, 1.40-1.53; CI 76-77, 76-79; SL 2.18-2.21, 2.14-2.34; SI 150-152, 148-155; PW 1.25-1.34, 1.22-1.34; MW 0.78, 0.69-0.81; PMI 160-172, 175-185; MTL 2.53-2.56, 2.50-2.74 (2+10 measured).

Anterior clypeal margin with acutely denticulate median flange, laterally flanked by widely obtuse teeth. Clypeus with distinct median carina; sinuate in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle indistinct. Frontal carinae sinuate with narrowly raised margins. Sides of head in front of eyes weakly convex towards mandibular bases; behind eyes, sides rounding into convex occipital margin. Eyes moderately convex, in full face view only reaching (in some modern specimens) or exceeding (in syntypes) lateral cephalic outline. Ocelli lacking. Pronotal humeri produced into dilated, dorsally shallowly concave, rounded prominences with distinctly raised margins; lateral margins behind humeri emarginate or notched, subparallel and rounding into laterally deeply impressed promesonotal suture. Mesonotum with lateral margins very narrowly raised, posteriorly converging into poorly indicated metanotal groove; propodeal margins terminating in slender, subparallel spines, obliquely elevated at bases and sinuate in side view. Petiole armed with pair of slender, divergent, acute spines with tips weakly curved outwards. Anterior face of first gastral tergite straight at base, widely rounding onto dorsum.

Mandibles longitudinally striate with pili-ferous pits. Clypeus closely punctate; vertex, sides of head and dorsum of mesosoma reticulate-punctate with sculpture forming weakly impressed vermiculate pattern, somewhat more distinct on vertex of head. Sides of mesosoma and posterior face of petiole finely reticulate. Anterior face of petiole, spines and gaster very smooth and highly polished.

Mandibles with curved, golden hairs at masticatory borders and shorter hairs along outer margins. Anterior clypeal margin with several setae medially and fringe of shorter

setae laterally. Dorsa of head, mesosoma, and petiole with numerous, short, bristle-like hairs, many hairs fringing lateral and dorsal outline of head; appendages, including antennal scapes, with very short, erect hairs. Gaster with abundant, posteriorly inclined, short golden hairs; hairs marginally longer around apex and on venter of gaster. Very sporadic, short, appressed, golden pubescence in various densities over most body surfaces; pubescence denser and silvery on propodeal declivity and venter of gaster.

Generally light to medium reddish-brown with vertex and mesosomal dorsum a shade darker; mandibular teeth, anterior margin of clypeus, frontal carinae, lateral margins of mesosoma, including spines, and mesopleural margins very narrowly lined with black.

*Queen.* Dimensions: TL c. 8.37; HL 1.81; HW 1.37; CI 76; SL 1.93; SI 141; PW 1.62; MTL 2.28 (1 measured).

Apart from sexual characters very similar to worker, except: pronotal humeri widely rounded with margins somewhat weakly, irregularly, notched. Mesoscutum marginally longer than wide, rather low anteriorly and flat in lateral view; median line distinct; parapsides flat. Mesoscutellum flat, marginally elevated above dorsal plane of mesosoma. Propodeal spines short, subparallel; petiolar spines shorter than in worker, obliquely elevated, divergent. Sculpturation distinctly coarser than in worker, notably on dorsa of mesoscutum and mesoscutellum, which are rather deeply rugose, without any regularity in pattern. Pilosity, pubescence and colour virtually identical to worker.

Male and immature stages unknown.

**Remarks.** *Polyrhachis lachesis* is very similar to *P. paxilla*, with most distinguishing characters given under the latter species. It is also relatively close to *P. schenkii* and it seems that Forel originally considered *P. lachesis* to be a subspecies of the latter (the original labels on syntype specimens read '*P. Schenki* For. r. *Lachesis* For.'). However, they are easily separated by differences in their size (HL 1.31-1.56 in *P. schenkii* versus 1.84-1.96 in *P. lachesis*),



the shape of the promesonotal dorsum (PMI 210-250 in *P. schenckii* versus 160-185 in *P. lachesis*) and the outline of the pronotal humeri that, in *P. lachesis*, are produced into dilated, dorsally shallowly concave, rounded prominences (Fig. 12A), while they are narrowly rounded or subangular in *P. schenckii* (Fig. 12G).

*Polyrhachis lachesis* inhabits open eucalypt forests and savannah woodlands, seemingly preferring bare ground without a grass cover as their nesting sites. It is not a very common species which occurs from Lakefield on Cape York Peninsula, south to about Gladstone.

***Polyrhachis* (*Hagiomyrma*) *lydiae* Forel, 1902**  
(Fig. 12C-D)

*Polyrhachis schencki* r. *lydiae* Forel, 1902:523. Syntype workers, queen. Type locality: QLD, Mackay (G. Turner), MHNG, QM (examined).

*Polyrhachis schencki* subsp. *lydiae* Forel. Emery, 1925:185 (variant spelling, combination in *P. (Hagiomyrma)*).

*Polyrhachis lydiae* Forel. Kohout, 1988:434 (raised to species).

**Other Material.** QLD: 6 km W of Mingela, 7.i.1977 (BBL) (w); 14 km E of Mingela, 5.i.1977 (BBL) (w); 40 km N of Townsville, 11.i.1977 (BBL) (w); Turtle Rock, Harvey Ra., 24.ix.1995 (SKR #20) (w); Townsville (G.F. Hill) (w); 40 km N of Charters Towers, 4.i.1977 (BBL) (w); Mt Elliot NP, Alligator Ck, 19°26'S, 146°57'E, 11.vi.1987 (RJK acc. 87.93) (w); 4 km S of Calcium, 19°41'S, 146°50'E, c. 150 m, 18.vii.1977 (RWT acc. 77.429) (w); Toomba, 19°58'43"S, 145°35'25"E, 14.ii.2007 (CJB) (w); Lords Table, W base, 22°39'35"S, 148°0'27"E, 8.iii.2006 (GBM) (w); ditto, SE base, 22°40'29"S, 148°1'13"E, 13-14.iii.2006 (CJB) (w); Scotts Peak, SE base, 22°51'35"S, 148°13'41"E, 9.iii.2006 (S. Wright, CJB) (w); Blackwater, Bowen Basin mines, iv.1994 (A.V. Spain) (w); 5 km E of Pentland, 3.i.1977 (BBL) (w); Calen, 17.xii.1972 (BBL) (w); Mackay, vi.1899 (E. Turner) (w); Eungella NP, Finch Hatton Gorge, 21°04'S, 148°38'E, 7-13. iv.1975 (RJK acc. 75.171) (w); ditto, 23.x.1995 (SKR #60) (w); Lorna Vale, nr Marlborough, 22°43'S, 149°46'E, 8.iv.1981 (RJK acc. 81.42) (w); 5 km NbyE of Mt Morgan, 23°37'S, 150°24'E, 27.x.1976 (RWT & TAW acc. 76.250) (w); Mt Morgan, 23°43'S, 150°22'E, 15.vi.1972 (S.A. Harrington) (w); Rundle Ra., 36 km NW of Gladstone, 23°39'S, 150°58'E, 24-30.iii.1975 (RJK acc. 75.116) (w); Cooloola SF, Rainbow Bch, 25°57'S, 153°05'E, 18-25.i.1975 (RJK acc. 75.43) (w); Darling Downs, E of Cecil Plains, 17.v.1966 (K.E. Lee) (w); Somerset Dam, 27°06'S, 152°33'E, 12.i.1975 (RJK accs 75.15, 27, 33) (w); Bribie I., Woorim, 27°04'S, 153°12'E, 28.xii.1976 (RJK acc. 76.114) (w); Boondall Wetlands, 27°20'21"S, 153°4'27"E, 11.xi.2003 (also 20.ii.2004) (QM Party) (w); Brisbane, 3.viii.1915 (H. Hacker) (w); Gold Ck Reservoir,

27°27'53"S, 152°52'32"E, 4.xi.2003 (QM Party) (w); Chelsea Rd Bushlands Res., 27°28'58"S, 153°11'15"E, 10.xi.2003 (QM Party) (w); Chapel Hill, Cassandra St, 27°29'43"S, 152°57'20"E, 15-16.iii.2003 (CJB) (w); Brisbane, Ithaca Ck, 18.ix.1979 (BBL) (w); Redlands, Hilliards Ck, nr Weippin Rd, 27°32'6"S, 153°14'54"E, 19-28.i.2009 (BAAM/QM Party) (♀); Karawatha For., 27°37'24"S, 153°4'38"E, 25-26.v.2005 (CJB) (w); Illaweena St, Drewvale, 27°38'39"S, 153°3'47"E, 17.ii.2004 (QM Party) (w); 0.8km SE of Spring Mtn, 27°43'36"S, 152°52'58"E, 19.iii.2005 (QM Party) (w); c. 7 km E of Jimboomba, 27°50'S, 153°06'E, 18.v.1975 (RJK acc. 75.190) (w); Darlington Ra., Cedar Ck, 27°54'S, 153°11'E, 10-15.ix.1974 (RJK acc. 74.84) (w); Mt Devlin, 7 km NE of Maryvale, 28°01'S, 152°17'E, 6-24.xi.1978 (RJK acc. 78.8) (w); Lamington NP, Binna Burra, 28°12'S, 153°11'E, 1.i.1974 RJK acc. 74.2) (w); Texas Caves, 28°56'S, 151°28'E, 14.viii.1975 (RJK acc. 75.193) (w). NSW: Mt Warning, 30.viii.1965 (BBL) (w); Anthony Pik, Upper Hunter Valley, 32°22'S, 150°56'E (ANA) (w); Raymond Terrace, 20.viii.1976 (BBL) (w).

**Description.** *Worker.* Dimensions (syntypes cited first): TL c. 5.80-6.50, 5.64-6.65; HL 1.55-1.70, 1.47-1.75; HW 1.22-1.37, 1.14-1.42; CI 79-81, 76-83; SL 1.50-1.65, 1.50-1.78; SI 117-123, 120-134; PW 1.14-1.22, 1.00-1.25; MW 0.69-0.70, 0.59-0.78; PMI 165-174, 160-174; MTL 1.60-1.85, 1.65-2.03 (6+30 measured).

Anterior clypeal margin with obtusely denticulate, median flange. Clypeus with posteriorly elevated, median carina; distinctly sinuate in profile and rounding into well impressed basal margin. Frontal triangle poorly indicated. Frontal carinae sinuate with moderately raised margins; central area rather flat with distinct frontal furrow. Sides of head in front of eyes converging towards mandibular bases in virtually straight line; behind eyes, sides rounding into weakly convex occipital margin. Eyes convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri rounded with margins weakly raised anteriorly; pronotal dorsum widest near midlength; lateral margins converging into distinctly impressed promesonotal suture. Mesonotum with lateral margins converging posteriorly; metanotal groove indistinct. Propodeal margins divergent, terminating in relatively short, horizontal, acute spines, with tips curved weakly outwards. Petiole with anterior face straight, posterior face descending towards base in weakly convex line; dorsum

armed with horizontal, divergent, acute spines. Anterior face of first gastral tergite straight at base, widely rounding onto dorsum.

Mandibles longitudinally striate at bases, rather smooth with piliferous pits towards masticatory borders. Head, mesosoma and petiole closely reticulate-punctate. Spines weakly rugose, tips smooth and polished. Gaster very finely shagreened, polished.

Mandibular masticatory and outer borders with a few curved, golden hairs. Anterior clypeal margin with a few anteriorly directed setae medially. Whole body, including appendages, with numerous, rather short, mostly erect, bristle-like, golden hairs, somewhat longer and posteriorly directed on gaster. Appressed, rather diluted, pale golden or silvery pubescence on head and mesosoma; more abundant, somewhat longer, medially radiating golden pubescence with distinct reddish hue on dorsum of gaster; pubescence much diluted on gastral venter.

Mandibles, clypeus, condylae, sides of head at mandibular bases, outer borders of frontal carinae, anterior and lateral pronotum, appendages, including coxae, and subpetiolar process mostly light or medium reddish-brown; clypeus and central area with somewhat purplish hue. Pronotal dorsum, except anteriorly, mesosoma and petiole distinctly metallic green. Gaster medium reddish-brown.

*Queen*. Dimensions (syntypes cited first): TL c. 6.90-7.00, 7.21-7.51; HL 1.70-1.75, 1.65-1.75; HW 1.35, 1.29-1.35; CI 77-79, 77-79; SL 1.55-1.60, 1.55-1.62; SI 115-119, 115-125; PW 1.50-1.55, 1.50-1.59; MTL 1.80-1.85, 1.80-1.87 (2+6 measured).

Apart from sexual characters very similar to worker, except: mesoscutum virtually as wide as long, anterior margin evenly rounded in dorsal view; relatively low with flat dorsum in lateral view; median line distinct; parapsides flat. Mesoscutellum only marginally elevated above dorsal plane of mesosoma. Propodeal spines very short, subparallel. Petiolar spines short, divergent. Sculpturation identical to worker; pilosity shorter with appressed pubescence generally more abundant. Colour scheme virtually identical to

that in worker, with additional reddish-brown patches on meso- and metapleura.

Males and immature stages present in the QM collection.

Remarks. *Polyrhachis lydiae* is a very easily recognised species due to its characteristic colour pattern. The metallic green colour is unusual and, apart from *P. lydiae*, occurs in only one another Australian *Polyrhachis* species, *P. hookeri* Lowne of the subgenus *Chariomyrma*. However, the combination of metallic green and reddish-brown in *P. lydiae* is unique.

*Polyrhachis lydiae* is a relatively common species, frequently encountered in open eucalypt forests and savannah woodlands. They build nests in the ground with their entrances usually hidden under stones or tufts of grass. *Polyrhachis lydiae* ranges along the eastern Australian seaboard from about Townsville in north Queensland to just north of Newcastle in New South Wales.

*Polyrhachis (Hagiomyrma) paxilla* Fr. Smith,  
1863  
(Fig. 12E-F)

*Polyrhachis paxillus* Fr. Smith, 1863:17. Holotype worker. Type locality: INDONESIA, Martabello (= Matabello I.) (A.R. Wallace), OXUM (examined).

*Polyrhachis paxilla* Fr. Smith, Emery, 1925:188 (combination in *P. (Chariomyrma)*); Kohout, 1988:435 (combination in *P. (Hagiomyrma)*).

*Polyrhachis lachesis* ssp. *maeandrifera* Emery, 1897:582. Holotype worker. Type locality: NEW GUINEA, Paumotu R. (= Angabanga R.) (L. Loria), MSNG (examined). Synonymy by Kohout (1988).

**Other Material.** INDONESIA, IRIAN JAYA: (as New Guinea: Neth.), Eramboe, 07°56'S, 140°56'E, 80 km ex Merauke, 29.i.1960 (T.C. Maa) (w). PAPUA NEW GUINEA: Morobe Prov., nr Vampit, c. 50 m, 06°45'S, 146°40'E, 24-27.viii.1984 (RJK acc 84.368) (w); Bulolo, 16.xii.1967 (BBL) (w). BISMARCK ARCHIPELAGO, NEW BRITAIN, Linga Linga, W of Willaumez Pen., 11.iv.1956 (L.J. Gressitt) (w). AUSTRALIA, QLD: Cape York Pen., Lockerbie Scrub, 23-27.iv.1973 (GBM) (w); ditto, 10°46'S, 142°29'E, 19-23.iii.1987 (RJK accs 87.18, 63) (w); Bamaga, 10°53'S, 142°23'E, 18.iii.1987 (RJK acc. 87.7) (w).

**Description.** *Worker*. Dimensions (holotype cited first): TL c. 8.92, 7.36-8.92; HL 2.17, 1.90-2.17; HW 1.66, 1.47-1.66; CI 76, 75-79; SL 2.47, 2.12-2.47; SI 149, 141-149; PW 1.54, 1.31-1.54; MW 0.86, 0.78-



0.86; PMI 179, 159-180; MTL 3.02, 2.50-3.02 (10 measured).

Anterior clypeal margin with obtusely denticulate median flange. Clypeus with median carina distinctly raised towards basal margin; strongly sinuate in profile. Frontal triangle distinct. Frontal carinae sinuate with margins distinctly raised at midlength. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes, sides widely rounding into convex occipital margin. Eyes moderately convex, in full face view only marginally breaking lateral cephalic outline. Ocelli lacking. Pronotal dorsum with raised lateral margins; pronotal humeri distinctly dilated, forming rounded or bluntly angular, laminate prominences. Mesonotum with posteriorly converging lateral margins; metanotal groove indistinct medially. Propodeal dorsum with margins subparallel, terminating in slender, acute spines, obliquely elevated from bases, sinuate at midlength, tips curved outwards. Petiole with anterior face terminating dorsally in jagged, transverse ridge, merging laterally into slender, acute, divergent spines with bases situated well below apex of dorsal convexity.

Mandibles longitudinally striate with piliferous pits. Clypeus finely punctate. Dorsa of head, mesosoma and petiole with characteristic vermiculate-rugose sculpturation; sides of mesosoma more finely reticulate. Gaster finely shagreened.

Mandibles with numerous golden, curved hairs at masticatory borders and shorter appressed hairs towards mandibular bases. All body surfaces, including outline of head and appendages, with numerous bristle-like, mostly erect hairs, shorter than maximum diameter of eyes. Hairs dark brown to black on dorsum, golden to golden-brown and generally shorter on ventral surfaces. Silvery, appressed pubescence in various densities over most body parts, denser with distinct rusty tint on gastral dorsum.

Black or very dark reddish-brown; mandibles, clypeus, antennae and spines medium to dark reddish-brown. Legs, including coxae distinctly

lighter, medium reddish-brown. Apex and venter of gaster blotched reddish-brown.

*Queen.* Dimensions: TL c. 8.77; HL 2.03; HW 1.47; CI 72; SL 2.28; SI 155; PW 1.78; MTL 2.81 (1 measured).

Apart from sexual characters very similar to worker, except: sides of head converging towards mandibular bases in straight line; eyes distinctly more convex, in full face view clearly exceeding lateral cephalic outline. Humeral angles of pronotum with narrowly rounded and weakly raised margins; mesoscutum distinctly wider than long with anterior margin widely rounded; median line distinct, parapsides flat. Anterior margin of mesoscutum in profile widely rounding onto virtually flat dorsum; mesoscutellum marginally elevated above dorsal plane of mesoscutum, weakly convex. Propodeal and petiolar spines shorter than in worker. Sculpturation, pilosity, pubescence and colour identical to worker.

Male unknown; single pupa in QM spirit collection.

**Remarks.** With its characteristic, vermiculate-rugose sculpturation, *P. paxilla* is easily recognised. It bears some similarity to *P. lachesis* and Forel (1897) redescribed it as *P. lachesis maeandrifera*. It is apparently a lignicolous species with a single nest collected from a dry, hollow bamboo internode. The nest was located on the edge of a small patch of lowland rainforest within swampy grassland in Papua New Guinea, a similar habitat to that on Cape York Peninsula where the Australian specimens of *P. paxilla* were collected. They were found foraging together with *P. bamaga* Kohout, a species of similar appearance and almost identical body sculpturation that belongs to the recently erected subgenus *Hirtomyrma* Kohout.

*Polyrhachis* (*Hagiomyrma*) *schenkii* Forel, 1886  
(Fig. 12G-H)

*Polyrhachis schenkii* Forel, 1886:198. Syntype workers. Type locality: Australia, QLD, Torres Strait, Darnley I., MHNG (examined).

*Polyrhachis schenki* Forel, 1902:523. Variant spelling.

*Polyrhachys* (*Hedomyrma*) *schenkii* Forel. Santschi, 1920:569 (variant spelling, combination in *P. (Hedomyrma)*).

*Polyrhachis schenckii* Forel. Emery, 1925:185 (variant spelling, combination in *P. (Hagionymra)*).

*Polyrhachis schenckii* Forel. Dorow, 1995:26.

*Polyrhachis schenckii* Forel. Bolton, 1995:356 (variant spelling).

**Other Material.** Papua New Guinea: Morobe Prov., Aztera Ra., Bubia Research Stn, 06°40'S, 146°55'E, 23-26.viii.1984 (RJK acc. 84.357) (w). Northern Prov., Oro Bay, 6.i.1973 (PMR) (w); Buna, 30.iv.1972 (PMR) (w); Girua, 4.xii.1971 (PMR) (w); Popondetta, 18.xii.1972 (PMR) (w). Central Prov., 3 km WSW of Sogeri, c. 500 m, 09°26'S, 147°23'E, 4 ix 1984 (RJK acc. 74.430) (w). WA, Kimberley area, Old Doongan, 15°19'S, 126°32'E, 2.viii.1975 (I.F.B. Common & M.S. Upton - Drysdale Survey 1975 Base) (w); Mitchell Plateau, 6 km E of Surveyor's Pool Camp, 14°38'S, 125°46'E, 4.v.1992 (S.O. Shattuck #33892-6) (w); 1.5 km W of King Edward R. x-ing, 14°53'S, 126°12'E, 5.v.1992 (S.O. Shattuck #3413-9) (w); Boongarree I., 15°05'S, 125°11'E, vi.1988 (ANA) (w). King Edward R., 15°09'S, 126°09'E, vi.1988 (ANA) (w). NT: Coburg Pen., Black Point, 11°09'S, 132°09'E, 31.i.1977 (E.D. Edwards) (w); ditto, 15-23.ii.1977 (TAW) (w); Coburg Pen., Cai man Ck, 11°15'S, 132°13'E, 19.ii.1977 (TAW) (w); Gove, Nhulumbuy, 1.xi.1972 (RWT acc. 72.824) (w); Obiri Rock, 12°25'S, 132°57'E, 7.vi.1973 (RWT acc. 73.473) (w); Gove Pen., 24-29. vi.1982 (JDM) (w); Groote Eylandt, vi.1982 (JDM) (w); Larrimah, 15°35'S, 133°12'E, 16.vii.1981 (BBL) (w); Howard Springs, 12°27'S, 131°03'E, 14.vii.1981 (BBL) (w); ditto, 5.iii.1991 (BDH) (w); Lake Bennett, 20.ii.1992 (BDH); Berry Springs, 7.ii.1993 (BDH) (w); Virginia, E of Darwin, 11.i.1993 (BDH) (w); Batchelor, 22.v.1993 (BDH) (w); Katherine Gorge, 21.x.1977 (P.J.M. Greenslade) (w); Nitmiluk (Katherine) NP, Dunlop Swamp, 10.iv.1993 (BDH) (w). QLD: Torres Strait, Murray I., 09°55'S, 144°05'E, vii.1974 (H&C) (w); Prince of Wales I., 10°40'S, 142°10'E, 6-15.ii.1975 (H&C #POW20) (w); Horn I., 2-8.xii.1986 (J. Gallon) (w); Badu I., 18.ii.1984 (J.H. Sedláček) (w); Cape York Pen., Lake Wicheura, 10°46'S, 142°34'E, 23.x.1993 (P. Zborowski & D. Rentz) (w); Heathlands, 11°45'S, 142°35'E, v.1993 (P. Zborowski & J. Lyon) (w); Bertie Ck, 11°50'S, 142°30'E, 21.x.1992 (P. Zborowski & T. Weir) (w); Iron Ra., 16.viii.1971 (R. Jenkins) (w); ditto, Mt Lamond, 12°44'S, 143°18'E, 9-15.vi.1971 (RWT & JEF acc. 71.257) (w); ditto, 12°43'S, 143°18'E, 1-3. vii.1976 (P. Filewood) (w); Silver Plains, Station Ck, 21.vi.60 (C.N. Smithers) (w); Cooktown, 20.vi.1955 (J. Beauglehole) (w); Davies Ck Rd, nr Mareeba, 3.viii.1975 (BBL) (w); Mareeba, 7.vi.1937 (T. Greaves) (w); Tinaroo Dam, 3.viii.1975 (BBL) (w); c. 8 km SW of Mt Garnet, 750 m, 3.vii.1971 (RWT & JEF) (w); Millstream NP, nr Ravenshoe, 6.viii.1975 (BBL) (w); 3.2km SE of Fanning R. Hmsd, 19°45.1'S, 146°27.1'E, 9.xii.2006-10.ii.2007 (S. Wright) (♀); 4 km NEbyN of Mingela, c. 220m, 19°53'S, 146°38'E, 18.vii.1977 (RWT acc. 77.411) (w); 14 km E of Mingela, 5.i.1977 (BBL) (w, ♀); Townsville, 4.viii. & 21.x.1902 (F.P. Dodd) (w); Flinders Hwy - 7 Mile Ck xing, 19°50.3'S, 146°43.6'E, 9.ii.2007 (CJB) (w); Toomba, 19°58.1'S, 145°34.8'E

Gregory Dev. Rd - Sardine Ck xing, 20°06.7'S, 146°26.5'E, 7-19.xii.2006 (GBM, DJC) (w); "Myola", 20°04.3'S, 146°28.0'E, 29.ix.-17.xii.2006 (QM Party) (w); Rochford Scrub, 20°07.0'S, 146°37.8'E, 10.xii.2006 (S. Wright) (w); 18 km N of Charters Towers, 4.i.1977 (BBL) (w, ♀); 10 km SW of Giru, 7.iii.1980 (BBL) (w); Porcupine Gorge NP, 20°30'S, 144°25'E, 13.v.1980 (BBL) (w); 5 km E of Pentland, 3.i.1977 (BBL) (w, ♀); 25 km SW of Ayr, 15.viii.1979 (BBL) (w); 60 km S of Ayr, 14.viii.1975 (BBL) (w).

**Description.** *Worker.* Dimensions (syntype cited first): TL c. 5.2, 4.99-6.50; HL 1.45, 1.31-1.56; HW 1.15, 0.97-1.20; CI 79, 74-79; SL 1.55, 1.43-1.78; SI 135, 135-159; PW 1.00, 0.81-1.06; MW 0.40-0.47; PMI 210-250; MTL 1.65, 1.53-2.00 (1+36 measured).

Anterior clypeal margin with emarginate, irregularly denticulate, median flange, flanked by acute angles. Clypeus with distinct median carina; sinuate in profile. Frontal triangle poorly indicated. Frontal carinae sinuate with weakly raised margins; central area rather flat with weakly impressed frontal furrow. Sides of head in front of eyes converging towards mandibular bases in almost straight line; behind eyes, sides rounding into convex occipital margin. Eyes relatively large, convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri narrowly rounded or bluntly angular (distinctly angular in some PNG specimens). Lateral margins of promesonotal dorsum with very narrowly raised margins, strongly converging posteriorly. Metanotal groove weakly impressed. Propodeal dorsum with lateral margins terminating in horizontal, divergent, acute spines. Petiole with posterior face sloping in even, moderately convex line; dorsum armed with horizontal, widely divergent, acute spines. Anterior face of first gastral segment higher than full height of petiole, evenly rounding onto dorsum.

Mandibles very finely, longitudinally striate with piliferous pits. Head, mesosoma and petiole distinctly reticulate-punctate; spines smooth and polished. Gaster shagreened.

Mandibular masticatory and outer borders with numerous, yellowish or golden, curved hairs. Anterior clypeal margin with a few longer setae medially and short setae fringing margin laterally. Numerous, mostly short,



erect hairs on all body surfaces, including antennal scapes and outline of head in full face view; rather longer, somewhat posteriorly directed hairs on gaster. Rather diluted, closely appressed, golden pubescence over most body surfaces; pubescence usually more abundant, somewhat longer and mostly pale golden or silvery on dorsum of gaster, but almost lacking in some specimens.

Yellowish- to rusty-red, with distinctly darker patches variously on vertex of head, dorsum of mesosoma and petiole. Mandibles with teeth dark reddish-brown; spines light reddish-brown. Anterior clypeal margin, frontal carinae and lateral margins of mesosoma narrowly lined with dark brown or black. Appendages, including coxae, light to medium reddish-brown; tarsi a shade darker. Gaster mostly dark, reddish-brown.

*Queen.* Dimensions: TL c. 6.85-7.16; HL 1.56-1.59; HW 1.18-1.22; CI 74-78; SL 1.56-1.59; SI 128-135; PW 1.40-1.47; MTL 1.81-1.84 (6 measured).

Apart from sexual characters, very similar to worker except: pronotal humeri narrowly rounded or bluntly angular in some specimens; mesoscutum as wide as long, lateral margins converging anteriorly into moderately rounded anterior margin; median line weakly indicated; parapsides flat; mesoscutum in profile widely rounded onto flat dorsum. Mesoscutellum flat, only marginally raised above dorsal plane of mesosoma. Propodeum armed with pair of horizontal, acute spines; dorsum rounding medially into virtually vertical declivity. Petiole with posterior face weakly convex; spines rather short, widely divergent. Sculpturation, pilosity, pubescence and colour identical to worker.

Males and immature stages in ANIC spirit collection.

**Remarks.** *Polyrhachis schenkii* is easily recognised by its small size, light-red or reddish-brown colour and the strongly posteriorly converging lateral margins of the promesonotal dorsum. It is one of the most widely distributed *Hagiomyrma* species, ranging from Papua New Guinea south across the Torres Strait to northern

Australia. *Polyrhachis schenkii* forms a number of variable populations. The pronotal humeri are very narrowly rounded or bluntly angular in Australian specimens, while they are distinctly angular in most specimens from Papua New Guinea. The antennal scapes of specimens from the Northern Territory are somewhat longer than those of other populations (SI 151-159 in specimens from the Northern Territory versus 138-149 in Queensland and PNG specimens). Also, the posterior face of the petiolar node is rather evenly convex in specimens from New Guinea and Cape York Peninsula, while in specimens from north Queensland and the Northern Territory the posterior face is uneven, with the base somewhat broader and swollen in lateral view. However, when specimens across the whole distribution are compared, no other significant differences are evident and I consider them to represent a single, albeit variable, species.

*Polyrhachis schenkii* is rather common in suitable localities in open eucalypt forest and savannah woodland. It is a ground nesting species with nest entrances usually hidden under a stone, piece of wood or a tuft of grass.

#### POLYRHACHIS (HAGIOMYRMA) TRAPEZOIDEA SPECIES-GROUP

##### *Polyrhachis* (*Hagiomyrma*) *darlingtoni* sp. nov. (Fig. 13A-B)

**Etymology.** Named in honour of the late Philip J. Darlington, former professor at Harvard University, Cambridge and eminent entomologist and biogeographer, who collected many *Polyrhachis* species and other insects during the 1932 and 1956-1958 Australia Harvard Expeditions.

**Material.** HOLOTYPE: QLD, Cape York Pen., McIlwraith Ra., 28 km NNE of Coen, 13°43'S, 143°19'E, 400 m, 25.viii.2004, *Araucaria* forest, under stone, P.S. Ward #15330 (worker). PARATYPES: data as for holotype (11 workers); ditto, 13°46'S, 143°19'E, c. 395 m, 24.vii.1977, low mixed forest, R.W. Taylor acc. 77.576 (9 workers); ditto, Lankelly Ck, vi.1932, P.J. Darlington, Aust. Harvard Exp. (14 workers). Type deposition: Holotype and 6 paratypes in ANIC; 4 paratypes each in MCZC and QM, 2 paratypes each in AMNH, BMNH, CASC, MHNG and NMNH.

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 11.79, 10.50-11.79; HL 2.68, 2.52-2.68; HW 1.90, 1.79-1.96; CI 71, 71-73; SL 3.58, 3.28-3.58; SI 188, 180-189; PW 1.56, 1.46-1.66; MW 1.09, 1.06-1.16; PMI 143, 142-152; MTL 4.33, 4.08-4.43 (9 measured).

Mandibles with 5 teeth, progressively reducing in length towards base. Anterior clypeal margin with median, shallowly emarginate, bluntly denticulate flange, laterally flanked by rather obtuse angles. Clypeus with median longitudinal carina; distinctly sinuate in profile, posteriorly rounding into impressed basal margin. Frontal carinae sinuate with moderately raised margins; central area with rather flat frontal furrow. Sides of head in front of eyes converging towards mandibular bases in very weakly convex line; behind eyes, sides rounding into occipital margin. Eyes convex, in full face view marginally breaking lateral cephalic outline. Ocelli lacking, positions indicated in some specimens by shallow pits in cephalic sculpture. Pronotal humeri narrowly rounded; dorsum almost quadrate with lateral margins very weakly converging anteriorly in some specimens and somewhat irregularly notched before their midlength; promesonotal suture deeply impressed. Mesonotum with lateral margins converging posteriorly towards distinct metanotal groove. Propodeal dorsum with lateral margins terminating in subparallel, somewhat sinuate, acute spines. Petiolar node markedly broad and low in lateral view, with anterior face rounding onto flat, strongly posteriorly descending triangular dorsum; spines very short, weakly divergent, bases situated well below apex of dorsal convexity. Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles finely longitudinally striate with numerous piliferous pits. Head and mesosoma finely reticulate-punctate, vertex of head and pronotal dorsum somewhat polished, mesonotum and propodeum opaque; tips of spines highly polished. Gaster shagreened.

Mandibles with numerous, semierect, curved, golden hairs. Medium length, erect hairs on clypeus, along frontal carinae and on vertex, numerous erect hairs fringing outline of head in full face view. Long, erect or semierect, rather abundant, golden hairs on dorsum of

mesosoma, coxae, venter of femora, petiole and gaster, most hairs as long as greatest diameter of eyes. Silvery appressed pubescence in various densities over most body surfaces, except vertex of head and pronotal dorsum where it is golden and sporadic; distinctly medially radiated pubescence with brassy tint abundant on mesonotal dorsum. Gastral dorsum with pubescence virtually hiding underlying sculpturation, golden with reddish hue along midline, silvery on sides and venter of gaster.

Black throughout with only mandibular teeth and condylae dark reddish-brown.

Sexuals unknown. Immature stages (larva and eggs) in QM spirit collection.

**Remarks.** *Polyrhachis darlingtoni* is easily identified by its low petiole with a strongly posteriorly descending, triangular dorsum and the bases of its rather short spines situated well below its widely rounded summit (Fig. 13B). The petiolar node of *P. darlingtoni* resembles that of *P. nourlangie* described below, however in the latter species the petiolar dorsum is flat, laterally marginate, with the margins terminating in the bases of short, curved spines on the petiolar summit (Fig. 13D). The species also differ in their size, with *P. darlingtoni* consistently larger (HL 2.59-2.67 versus 1.62-2.09 in *P. nourlangie*), and in the colour of their pubescence which, in *P. nourlangie* is uniformly golden, lacking the brassy and reddish hues of *P. darlingtoni*.

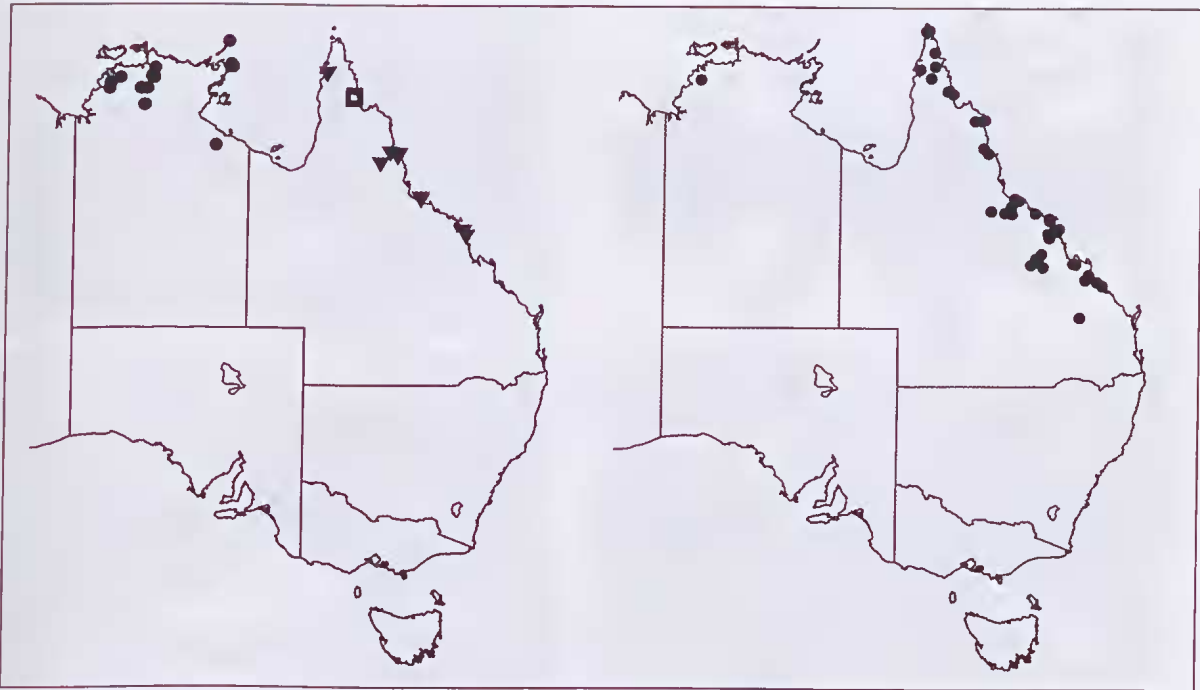
*Polyrhachis darlingtoni* is only known from two closely situated localities in the McIlwraith Range, along Leo Creek Road and at Lankelly Creek, near Coen on Cape York Peninsula.

*Polyrhachis (Hagiomyrma) nourlangie* sp. nov.  
(Fig. 13C-D)

**Etymology.** After the type locality, Nourlangie Rock in Kakadu National Park, Northern Territory.

**Material.** HOLOTYPE: NT: Kakadu NP, Nourlangie Rock, 12°51'S, 132°49'E, 18.xi.1993, R.J. Kohout acc. 93.50, QMT174515 (worker). PARATYPES: data as for holotype (28 workers). Type deposition: Holotype and most paratypes in QM, 2 paratypes each in AMNH,





*POLYRHACHIS (HAGIOMYRMA) TRAPEZOIDEA SPECIES GROUP*

Map 1 ● *P. nourlangie* ▼ *P. thusnelda* ■ *P. darlingtoni*  
 Map 2 ● *P. trapezoidea*

ANIC, BMNH, CASC, MCZC, MHNG, MLAC and NMNH.

**Other Material.** NT: Wessell Is, Rimbija I., 11°01'S, 136°45'E, 3-14.ii.1977 (TAW) (w); Arnhem Land, Dhallwuy, 5.x.2002 (BDH) (w); NE Arnhem Land, Cape Arnhem, 7.x.2002 (BDH) (w); ditto, nr Mt Dundas, 5.x.2002 (BDH) (w); Baroalba Springs, 12°47'S, 132°51'E, 16-17.xi.1972 (RWT & JEF acc. 72.1043) (w); Kakadu NP, Nourlangie Rock, 12°51'S, 132°49'E, 21.iii.1987 (ANA) (w); ditto, Koolpin Gorge, 3.viii.1997 (ANA) (w); Sawcut Gorge, 12°55'S, 132°56'E, 19.xi.1972 (RWT & JEF acc. 72.1087) (w); 46 km SSW of Borroloola, 16°28'S, 136°09'E, 23.iv.1976 (JEF) (w); Lake Bennett, 20.ii.1992 (BDH) (w); Litchfield NP, Sandy Ck Falls, 14.vii.1992 (BDH) (w); ditto, Wangi Falls, 13°10'S, 130°41'E, 13.ii.1994 (RJK acc. 94.16) (w); Kakadu NP, Bukbukluk, 13°29'S, 132°15'E, 23.xi.1993 (RJK acc. 93.60) (w); Nitmiluk NP, Dunlop Swamp, 10.iv.1993 (BDH) (w); ditto, 8th Gorge, 11.xi.1992 (BDH) (w); ditto, 11.vii.1976 (R. Mercer) (w); ditto, Amphitheatre-Crystal Falls track, 15-16.iii.1995 (GBM & H. Janetzki) (w); ditto, 14°19'S, 132°28'E, 25.xi.1993 (RJK acc. 93.62) (w).

**Description.** *Worker*: Dimensions (holotype cited first): TL c. 7.61, 6.6-8.3; HL 1.84, 1.62-2.09; HW

1.53, 1.36-1.75; CI 83, 81-86; SL 2.46, 2.25-2.71; SI 161, 152-165; PW 1.18, 1.06-1.40; MW 0.86, 0.84-1.00; PMI 137, 125-137; MTL 2.78, 2.43-3.03 (17 measured).

Anterior clypeal margin shallowly emarginate and obtusely denticulate medially, without clearly defined median flange. Clypeus with median carina; sinuate in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle indistinct. Frontal carinae sinuate with moderately raised margins; central area relatively wide, flat with distinct frontal furrow. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes, sides rounding into convex occipital margin. Eyes moderately convex, in full face view, only marginally exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with humeri rounded; lateral margins emarginate at midlength; promesonotal suture distinctly impressed. Mesosomal dorsum with posteriorly converging lateral margins; metanotal groove

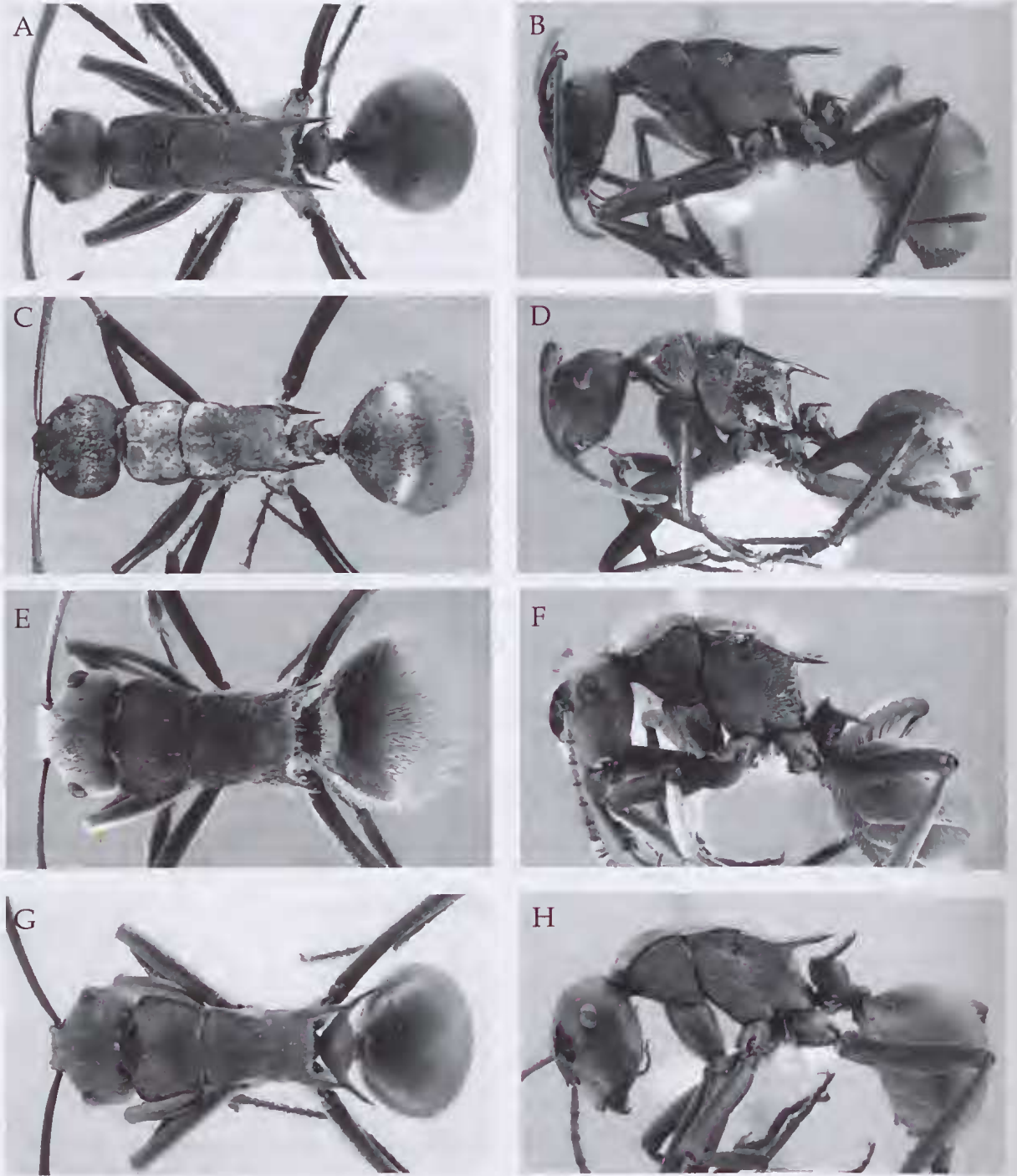


FIG. 13. *Polyrhachis* (*Hagiomyrma*) *trapezoidea* species-group – dorsal (left) and lateral (right) view. A-B, *P. darlingtoni* sp. nov.; C-D, *P. nourlangie* sp. nov.; E-F, *P. thusnelda* Forel; G-H, *P. trapezoidea* Mayr (not to scale).



indistinct. Propodeal margins subparallel; spines moderately long with inner margins parallel, outer margins sinuate, with extreme tips weakly curved outwards. Petiole markedly low and broad at base in lateral view, anterior face inclined forwards before rounding onto virtually flat, laterally marginate dorsum, margins terminating in bases of short, curved spines (Fig. 13D). Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles finely, longitudinally striate with piliferous pits. Head, mesosoma and petiole closely reticulate-punctate. Spines sculptured at bases, rather smooth and polished towards tips. Gaster finely shagreened.

Mandibles at masticatory and along outer borders with numerous, curved, golden hairs. Anterior clypeal margin with several anteriorly projecting setae medially. Clypeus, central area and vertex with several short to medium length, erect hairs; outline of head in full face view with numerous, erect, relatively short hairs. Leading edge of antennal scapes with several, very short, erect hairs. Dorsum of mesosoma with numerous, somewhat posteriorly inclined hairs, those on propodeum and petiole marginally longer. Several, medium length hairs on coxae and venter of femora. Gaster with relatively abundant, distinctly longer, posteriorly inclined, golden hairs. Closely appressed, rich golden, pubescence, rather diluted on vertex of head and sides of mesosoma; pubescence somewhat medially radiating and dense on mesosomal dorsum and petiole, completely hiding underlying sculpturation. Gaster with dense, somewhat longer, golden pubescence on dorsum; pubescence less dense, pale golden on sides and silvery on venter.

Black; mandibular teeth reddish-brown.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis nourlangie* is somewhat similar to *P. darlingtoni* with the main distinguishing characters given in the remarks section of the latter. The distribution of *Polyrhachis nourlangie* is centred on the northern parts of the Northern Territory, including the islands adjacent to Arnhem Land. It is locally

common in open eucalypt forest, extending into savannah woodland in Nitmiluk National Park at the southern limit of its distribution.

*Polyrhachis* (*Hagiomyrma*) *thusnelda* Forel,  
1902

(Fig. 13E-F)

*Polyrhachis thusnelda* Forel, 1902:509. Syntype workers, queen, males. Type locality: QLD, Mackay (G. Turner), MHNG, QM (examined).

**Other Material.** QLD: Cape York Pen., Weipa, vii.1982 (JDM) (w); Hann Tbl'd (Nth Base), 16°48'S, 145°12'E, c. 500 m, 11-14.xii.1995 (GBM, GIT, DJC) (w); 10 km N of Cairns, 9.viii.1975 (BBL) (w); Davies Ck, 15 km E of Mareeba, 17°00'S, 145°34'E, 15.vi.1980 (RJK accs 80.26, 29) (w); Almaden, SE of Chillagoe, 17°21'S, 144°41'E, 4.v.1990, savannah woodland (BBL) (w); Townsville, 9.x.1902 (F.P. Dodd) (w); Mt Stuart, nr Townsville, 19°10'S, 146°47'E, 12.iii.1993 (GBM) (w); Cape Hillsborough NP, 20°55'S, 149°03'E, 10-11. iv.1981 (RJK accs 81.56, 67, 70, 73) (w).

**Description.** *Worker.* Dimensions (syntypes cited first): TL c. 8.62-8.92, 8.16-9.12; HL 2.00-2.03, 1.93-2.15; HW 1.81-1.84, 1.75-2.00; CI 90-91, 90-94; SL 2.25-2.28, 2.21-2.46; SI 124, 118-125; PW 1.78-1.84, 1.72-2.01; MW 1.09-1.12, 1.00-1.28; PMI 159-169, 156-172; MTL 2.56-2.59, 2.43-2.84 (6+16 measured).

Anterior clypeal margin with very shallow, denticulate, median flange, laterally flanked by acute teeth. Clypeus straight in profile with only weakly raised median carina; basal margin flat. Frontal triangle indistinct. Frontal carinae sinuate, with moderately raised margins; central area wide with distinct frontal furrow. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes, sides narrowly rounding into weakly convex occipital margin. Eyes convex, in full face view not or only marginally exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri shallowly concave; pronotal dorsum with moderately raised margins converging into distinct promesonotal suture. Mesosomal margins converging into weakly impressed metanotal groove. Propodeum armed with broad-based, relatively short, divergent spines. Petiole with anterior and posterior faces subparallel; dorsum with distinct, flat platform, laterally armed with horizontal, divergent, acute spines. Anterior

face of first gastral tergite widely rounding onto dorsum.

Mandibles finely longitudinally striate with numerous piliferous pits. Head and mesosoma very closely, distinctly reticulate-punctate; pronotal dorsum with sculpture distinctly coarser, somewhat vermiculate-rugose in some specimens. Bases of spines sculptured, tips smooth and polished. Petiole with anterior face polished, posterior face deeply sculptured; dorsal platform distinctly reticulate. Gaster shagreened with dorsum more distinctly sculptured.

Mandibles at masticatory and outer borders with numerous curved, golden hairs. Anterior clypeal margin with a few longer, anteriorly projecting setae medially and several short setae fringing margin laterally. Head, mesosoma, petiole, gaster and venter of femora with numerous, mostly erect and variously curved, long silvery hairs, many distinctly longer than greatest diameter of eyes. Hairs on head more anteriorly directed with none breaking lateral cephalic outline between eyes and mandibular bases in full face view. Hairs lacking on antennal scapes, dorsal surfaces of femora, most of propodeal declivity and sides of mesosoma, except a few hairs on metapleurae. Closely appressed, silvery pubescence in various densities over most body surfaces, partly hiding underlying sculpturation; pubescence on gaster somewhat longer, silvery on sides and venter, rich golden on dorsum, completely hiding underlying sculpturation.

Black; mandibular teeth narrowly reddish-brown; antennal segments progressively lighter reddish-brown towards apices.

*Queen*. Dimensions: TL c. 9.47-10.18; HL 2.12-2.21; HW 1.84-2.00; CI 87-90; SL 2.21-2.28; SI 114-120; PW 2.15-2.20; MTL 2.62-2.68 (4 measured).

Apart from sexual characters, very similar to worker except: pronotal humeri more-or-less subangular. Mesoscutum wider than long with anterior margin widely and evenly rounded in dorsal view; median line bifurcate towards flat dorsum; parapsides flat, only weakly raised posteriorly. Mesoscutellum flat,

not elevated above dorsal plane of mesosoma. Spines distinctly shorter than in worker. Sculpturation, pilosity, pubescence and colour virtually identical to worker.

Males evidently in MHNG collection. Immature stages present in the QM spirit collection.

**Remarks.** *Polyrhachis thusnelda* is easily recognised by a combination of a flat-topped petiolar dorsum, most of the body covered with long hairs and a black body strongly contrasting with rich golden pubescence on the gastral dorsum. It is a relatively widespread species with a patchy distribution from Cape York Peninsula south to about Mackay, Queensland. However, it becomes rather uncommon towards the northern limits of its range. It inhabits open eucalypt forests, but has also been collected from the canopy of lowland tropical rainforest. For information on the lithocolous nesting habit of *P. thusnelda*, see Robson & Kohout (2005: 164-169).

*Polyrhachis (Hagiomyrma) trapezoidea* Mayr,  
1876  
(Fig. 13G-H)

*Polyrhachis trapezoidea* Mayr, 1876:72. Syntype workers, queen, male. Original localities: QLD, Rockhampton, Peak Downs (A. Dietrich, E. Dämel), NHMW (examined).

*Polyrhachis (Hagiomyrma) ammon* r. *trapezoidea* Mayr. Forel, 1915:108. (combination in *P. (Hagiomyrma)* and race of *P. ammon*).

*Polyrhachis trapezoidea* Mayr. Emery, 1925:185 (revived status as species).

**Other Material.** NT: Litchfield NP, nr Tolmer Falls, 13°12'S, 130°42'E, 10.viii.1991 (ANA) (w). QLD: Torres Strait, Horn Island, 10°37'S, 142°17'E, 10-27.vi.1974 (H&C) (w); Prince of Wales Is., 10°40'S, 142°10'E, 6-15.ii.1975 (H&C) (w); Cape York Pen., Moreton Telegraph Stn, 1958 (G. Hall) (w); Leo Kitchen Camp, 17.x.1958 (J.L. Wassel) (w); 6 km E of Heathlands, 18-22.iv.1992 (G. Cassis) (w); Weipa, vii.1982 (JDM) (w); Weipa, MRRP study site N1b, v-vi.1995 (ANA) (w); Merluna turnoff, 20.viii.1958 (E. Exley) (w); Iron Ra., 12°43'S, 143°18'E, 1-3.vii.1976 (P. Filewood) (w); ditto, 26-31.vii.1981 (RJK acc. 81.203) (w); McIlwraith Ra., Peach Ck, 13°46'S, 143°18'E, c. 170 m, 24.vii.1977 (RWT acc. 77.583) (w); Leo Ck, 10-20.vii.1976 (P. Filewood) (w); Battlecamp Rd, 21.vii.2002 (ANA) (w); 1 km N of Rounded Hill, 15°75'S, 145°13'E, 5-7.v.1981 (JEF) (w); Bakers Blue Mtn, 17 km W of Mt Molloy, 12.ix.1981 (GBM & DLC) (w); Mareeba, 3.viii.1975 (BBL) (w); Townsville, James Cook University



Campus, 4.vi.1993 (C.J. Hill) (w); Harvey Ra, nr Townsville, 24.ix.1995 (SKR #15) (w); Mt Elliot NP, Alligator Ck, 19°26'S, 146°57'E, 2.x.1977 (RJK accs 77.5, 9) (w); ditto, 11.vi.1987 (RJK acc. 87.96) (w); Toomba, 19°58'43"S, 145°35'25"E, 14.ii.2007 (CJB) (w); ditto, 19°58'5"S, 145°34'49"E, 14-16.xii.2006 (GBM, DJC) (w); 30 km SbyW of Charters Towers, 20°05'S, 146°16'E, c. 330 m, 17.vii.1977 (RWT acc. 77.390) (w); Mt Abbott, E base, Finley Ck, 20°06'S, 147°49'E, 13.iv.1997 (CJB) (w); Proserpine, nr Kelsey Substation, 20°23'23"S, 148°32'26"E, 11-17.ii.2007 (C. Lambkin, N. Starick) (w); Proserpine, 20°29'14"S, 148°34'19"E, 8.xi.2007 (CJB) (w); ditto, Airport Drive, 20°29'17"S, 148°33'55"E, 7.xi.2007 (CJB) (w); Rochford Scrub, 20°6'59"S, 146°37'48"E, 10-11.xii.2006 (S. Wright) (w); Cape Hillborough NP, 20°55'S, 149°02'E, 2.i.1979 (RJK acc. 79.11) (w); ditto, 10-11.iv.1981 (RJK accs 81.57, 80, 81, 85) (w); 1.5 km SE of Mt Ossa, 20°58'S, 148°50'E, 28.xi.1976 (RJK acc. 76.92) (w); Mt Blackwood NP, 21°02'S, 148°56'E, 14.iv.1981 (RJK acc. 81.101) (w); Eungella NP, Broken R., 21°10'S, 148°30'E, 29.xi.1976 (RJK acc. 76.101) (w); Britton Ra., 6 km NNE of Homevale, 21°23'S, 148°33'E, 1-6.iv.1975 (RJK accs 75.159, 164) (w); Mt Castor, 22°28'6"S, 147°52'32"E, 6.iii.2006 (QM Party) (w); Lords Table, 22°40'29"S, 148°1'13"E, 13.i-4.iii.2006 (CJB) (w); Lorna Vale, nr Marlborough, 22°43'S, 149°46'E, 8.iv.1981 (RJK acc. 81.40) (w); c. 4-10 km N of Marlborough, 22°45'S, 149°54'E, 9.iv.1981 (RJK acc. 81.49) (w); 6.5km NNW of Clermont, 22°46'12"S, 147°37'35"E, 13.i-7.iii.2006 (CJB, GBM) (w); Scotts Peak, SE base, 22°51'35"S, 148°13'41"E, 9.iii.2006 (S. Wright, CJB) (w); 6 km N of Mt Archer, nr Rockhampton, 23°17'S, 150°34'E, 4.i.1979 (RJK acc. 79.17) (w); Bouldercombe, 23°32'S, 150°25'E, 22.iv-19.vii.1990 (D. Wallace & R. Raven, DW15) (w); Rundle Ra., 36 km NW of Gladstone, 23°39'S, 150°59'E, 24-30.iii.1975 (RJK accs 75.116, 119, 129) (w); Gladstone, xi.1925 (A. Musgrave) (w); Taroom Distr., Boggomoss, 25°29'0"S, 150°8'0"E, 14.xi.1996 (QM Survey) (w).

**Description.** *Worker*: Dimensions (syntypes cited first): TL c. 8.92-9.07, 7.61-9.42; HL 2.18-2.21, 1.87-2.21; HW 1.84, 1.53-1.90; CI 83-84, 80-85; SL 2.50-2.53, 2.15-2.71; SI 136-137, 128-140; PW 1.68, 1.37-1.78; MW 0.72-0.84; PMI 197-221; MTL 2.87-3.03, 2.50-3.21 (2+13 measured).

Anterior clypeal margin with denticulate, shallowly 'V'-shaped emarginate, median flange. Clypeus with blunt median carina; almost straight in profile with virtually flat basal margin. Frontal carinae sinuate with weakly raised margins; central area relatively wide with distinct frontal furrow. Sides of head in front of eyes converging towards mandibular bases; behind eyes, sides narrowly rounding into weakly convex occipital margin. Eyes

convex, in full face view marginally breaking lateral cephalic outline. Ocelli lacking. Pronotal and mesonotal dorsa distinctly converging posteriorly; pronotal humeri rounded with raised margins; promesonotal suture distinctly impressed, metanotal groove poorly indicated. Lateral margins of propodeum weakly divergent, terminating in more-or-less horizontal, acute spines with tips bent slightly outwards and upwards. Petiole with relatively wide, posteriorly sloping dorsum and horizontal, widely divergent, acute spines.

Mandibles finely, longitudinally striate with numerous piliferous pits. Head and mesosoma finely reticulate-punctate; gaster finely shagreened.

Mandibular masticatory borders with medium length, variously curved, golden hairs. Very short, erect, bristle-like golden hairs on dorsa of head, mesosoma and petiole; gaster with somewhat longer hairs, notably around apex and on venter. Mostly golden, closely appressed pubescence in various densities on most dorsal surfaces; pubescence distinctly medially radiating, denser and with somewhat brassy hue along dorsal midline of mesosoma, completely hiding underlying sculpturation. Dorsum of gaster with abundant, rather pale golden pubescence, progressively more silvery towards sides and venter; first gastral tergite medially with rather narrow, rich golden median patch that widens posteriorly.

Black, with only narrow reddish-brown band along mandibular masticatory borders.

*Queen*. Dimensions (syntype cited first): TL c. 9.68, 9.63-11.09; HL 2.18, 2.18-2.31; HW 1.72, 1.72-1.84; CI 79, 79-80; SL 2.31, 2.31-2.46; SI 134, 132-138; PW 1.96, 1.96-2.21; MTL 2.77, 2.81-2.90 (5 measured).

Apart from sexual characters, very similar to worker except: pronotal humeri bluntly angular; lateral margins slightly raised and weakly rounded posteriorly. Mesoscutum with dorsum flat, as wide as long in dorsal view; median line bifurcate anteriorly; parapsides only slightly raised posteriorly. Mesoscutellum flat, not elevated above dorsal plane of



**POLYRHACHIS (HAGIOMYRMA) TUBIFERA  
SPECIES-GROUP**

Map 1 ● *P. diversa*

Map 2 ● *P. tubifera*

mesosoma. Propodeal dorsum convex with spines shorter than worker, subparallel and slightly bent downwards. Petiole as in worker with spines shorter. Sculpturation, pilosity, pubescence and colour virtually identical to worker.

Male evidently in NHMW. Immature stages (eggs, larvae in various stages of development and pupae) in QM spirit collection.

**Remarks.** *Polyrhachis trapezoidea* is very similar to *P. aurora* with the main distinguishing characters given in the remarks under the latter species. The known distribution of *P. trapezoidea* extends from Torres Strait south to about Gladstone, with reports of its occurrence in the northern part of the Northern Territory (Andersen, 2000). *Polyrhachis trapezoidea* is relatively common in open eucalypt forests and savannah woodlands and, like most of other *Hagiomyrma* species, nests in the ground.

**POLYRHACHIS (HAGIOMYRMA) TUBIFERA  
SPECIES-GROUP**

***Polyrhachis (Hagiomyrma) diversa* sp. nov.  
(Fig. 14A-B)**

**Etymology.** Derived from the Latin word *diversus*, meaning different, in reference to several characters separating *P. diversa* from the very similar *P. tubifera*.

**Material.** HOLOTYPE: QLD, Cape York Pen., Mt Tozer summit, 12°45'S, 143°13'E, 8.xii.1985, G.B. Monteith & D.J. Cook, QMT174516 (worker).

PARATYPES: data as for holotype (6 workers); Mt Lamond, 12°44'S, 143°18'E, 19-15.vi.1971, RWT & JEF accs 71.259, 266 (3 workers); Iron Ra., 12°43'S, 143°18'E, 26-31.vii.1981, RJK acc. 81.203 (1 worker). Type deposition: Holotype and 2 paratype workers in QM, 2 paratype workers each in ANIC, BMNH and MCZC.

**Other Material.** QLD: Cape York Pen., Captain Billy Ck, 11°40'S, 142°50'E, 9-13.vii.1975 (GBM) (w).

**Description.** *Worker.* Dimensions (holotype cited first): TL c. 6.35, 5.80-6.65; HL 1.56, 1.50-1.68; HW 1.31, 1.28-1.47; CI 84, 84-89; SL 1.75, 1.70-1.90; SI 133, 127-136; PW 1.50, 1.34-1.62; MW 1.03; PMI 145; MTL 1.75, 1.68-1.96 (10 measured).

Anterior clypeal margin medially widely truncate and denticulate, without clearly defined median flange. Clypeus with median, anteriorly elevated carina; sinuate in profile with rather flat basal margin. Frontal carinae sinuate with weakly raised margins anteriorly, virtually flat posteriorly; central area relatively wide with flat frontal furrow. Sides of head converging anteriorly towards mandibular bases in straight line; behind eyes, sides rounding into relatively low occipital margin. Eyes weakly convex, in full face view almost reaching lateral cephalic outline. Ocelli lacking, relative positions indicated by shallow pits in cephalic sculpture. Mesosoma relatively broad and short, strongly convex in lateral view. Pronotal dorsum with humeri rounded; lateral margins weakly raised, converging towards deeply laterally impressed promesonotal suture. Metanotal groove indistinct; mesonotal and propodeal dorsa in lateral view forming uninterrupted, convex line before rounding into vertical declivity. Propodeal spiracles prominent, situated on laterally projecting tubercles. Lateral margins of propodeum strongly divergent, terminating in broad-based, relatively short, acute, spines. Petiole very narrow in lateral view with anterior face straight, posterior face weakly convex; dorsum transversely wide, armed with very short, divergent spines. Anterior face of first gastral tergite distinctly higher than full height of petiole, widely rounding onto dorsum.



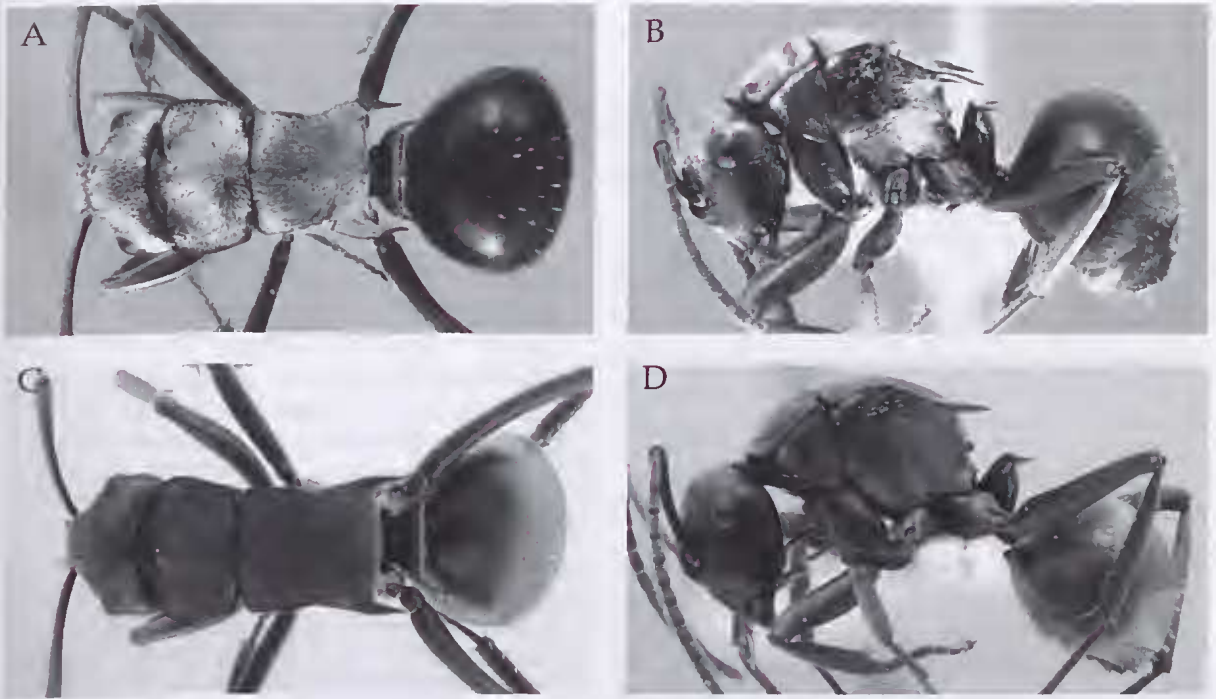


FIG. 14. *Polyrhachis* (*Hagiomyrma*) *tubifera* species-group – dorsal (left) and lateral (right) view. A-B, *P. diversa* sp. nov.; C-D, *P. tubifera* Forel (not to scale).

Mandibles very finely, longitudinally striate with numerous piliferous pits. Head, mesosoma and petiole closely reticulate-punctate. Gaster very finely shagreened.

Mandibles at masticatory borders and along outer borders with numerous golden hairs. Anterior clypeal margin medially with several medium length, golden setae. Several short to medium length, mostly erect hairs on clypeus, along frontal carinae, vertex, anterior face of front coxae and venter of mid and hind coxae and femora; only a few very short, erect hairs on dorsum of pronotum and mesonotum. Dorsum of gaster with a few short hairs; apical segments and venter with numerous, medium length, posteriorly directed, golden hairs. Abundant closely appressed, rich golden pubescence on dorsum of head, mesosoma and petiole, completely hiding underlying sculpturation; pubescence less dense and pale golden or silvery on clypeus and sides of head, mesosoma and petiole. Short, silvery, closely appressed pubescence on venter of gaster; pubescence virtually absent from gastral dorsum.

Black; mandibular teeth and appendages dark reddish-brown; gaster medium reddish-brown, semi-polished.

Sexuals and immature stages unknown.

**Remarks.** *Polyrhachis diversa* is very similar to *P. tubifera* and they share a relatively short and wide, evenly arched mesosoma, distinctly elongated propodeal spiracles and very short petiolar spines that are separated by the transversely wide dorsum of the petiole. However, *P. diversa* features rich, closely appressed, golden pubescence that is absent in *P. tubifera*. In contrast, *P. diversa* has virtually no pubescence on the dorsum of the gaster, while in *P. tubifera* the gastral dorsum is covered with rich golden pubescence that completely hides the underlying sculpturation.

*Polyrhachis diversa* differs from most other *Hagiomyrma* species by inhabiting rainforest, where it has been collected upon the trunks and foliage of trees.

*Polyrhachis (Hagiomyrma) tubifera* Forel,  
1902  
(Fig. 14C-D)

*Polyrhachis tubifera* Forel, 1902:517. Syntype workers, males. Type locality: QLD, Mackay (G.Turner), MHNG (examined).

*Polyrhachis tubifera* Forel. Emery, 1925:185 (combination in *P. (Hagiomyrma)*).

**Other Material.** QLD: Cape York Pen., 13 km E by S of Weipa, 12°40'S, 143°00'E, 15-19.ii.1994 (P. Zborowski) (w); Weipa, Uningan Nature Reserve, 1.vi.1995 (ANA) (w); Weipa, MRRP study site N2a, v-vi.1995 (ANA) (w); Iron Ra., 12°43'S, 143°18'E, 26-31.vii.1981 (RJK acc. 81.203) (w); Lizard I., 14°40'S, 145°28'E, 14 & 22.ii.1992 (H. Reichel) (w); Mt Cook, nr Cooktown, 17.vii.2002 (ANA) (w); Barratt Ck, 4 km ESE of Daintree, 15°15'S, 145°21'E, 21.vii.1980 (RJK acc. 80.100) (w); Davies Ck Falls, nr Mareeba, 29.vi.1971 (RWT & JEF acc. 71.781) (w); ditto, 3.viii.1975 (BBL) (w); Herberton, 7.viii.1975 (BBL) (w); Wallaman Falls, 18°38'S, 145°48'E, 28.ix.1987 (RJK acc. 87.99) (w); Mt Elliot NP, Alligator Ck, 19°26'S, 146°57'E, 11.vi.1987 (RJK acc. 87.89) (w); Red Falls, basalt, 19°55'33"S, 145°44'1"E, 15.ii.2007 (CJB, GBM) (w); Toomba, 19°58'1"S, 145°34'46"E, 14.ii.2007 (CJB) (w, ♀); Gregory Dev. Rd, 14km NW Clarke R., 19°7'53"S, 145°20'14"E, 17.xii.2006-15.ii.2007 (GBM, DJC) (w); Mt Abbott, SE slopes, 20°07'S, 147°46'E, <500 m, 9-12.iv.1997 (CJB) (w); Proserpine, 20°29'14"S, 148°34'19"E, 10-16.ii.2007 (C. Lambkin, N. Starick) (w); ditto, Airport Drive, 20°29'17"S, 148°33'55"E, 7.xi.2007 (CJB) (w); ditto, Deadman Ck, 20°30'18"S, 148°33'22"E, 10.xi.2007 (CJB) (w); Brampton I., 20°49'S, 149°16'E, 1.i.1979 (RJK acc. 79.1) (w); Newry I., 20°51'S, 148°55'E, 31.xii.1978 (RJK acc. 78.19) (w); Cape Hillsborough NP, 20°55'S, 149°03'E, 10-11.iv.1981 (RJK acc. 81.54) (w); ditto, 22.x.1995 (SKR #45) (w); Mt Blackwood NP, 21°02'S, 148°56'E, 14.iv.1981 (RJK acc. 81.98) (w); Eungella NP, Finch Hatton Gorge, 21°04'S, 148°38'E, 7-13.iv.1975 (RJK acc. 75.171) (w); ditto, 16.iv.1981 (RJK acc. 81.122) (w); 18 km SW of Walkerston, 16.8.1975 (BBL) (w); Britton Ra., 6 km NNE of Homevale, 21°23'S, 148°33'E, 1-6.iv.1975 (RJK acc. 75.159) (w); Sarina, 16.viii.1975 (BBL) (w); 30 km S of Sarina, 30.vii.1975 (BBL) (w); Cooloola SF, Rainbow Beach Rd, 25°47'S, 153°05'E, 7.xii.1974 (RJK acc. 74.144) (w); ditto, 18-25.i.1975 (RJK acc. 75.68) (w); Chelsea Rd Bushlands Res., 27°28'58"S, 153°11'15"E, 24.ii.2004 (QM Party) (w, ♀); Ransome Res., 27°29'34"S, 153°11'5"E, 23.iv.2003 (E. Volschenk, S. Wright) (w); Enterprise Mine, 27°34'27"S, 153°26'20"E, 11.i.2002 (QM Party) (w); Karawatha For., 27°37'33"S, 153°5'24"E, 17.ii.2004 (QM Party) (w).

**Description.** *Worker*: Dimensions (syntypes cited first): TL c. 6.0-7.25, 5.49-7.25; HL 1.6, 1.40-1.6; HW 1.37-1.4, 1.15-1.4; CI 86-87, 82-89; SL 1.8, 1.56-1.81; SI 128-131, 125-141; PW 1.45, 1.15-1.45; MW 1.12, 0.90-1.12; PMI 129, 120-139; MTL 1.9, 1.64-1.93 (2+16 measured).

Anterior clypeal margin truncate medially, truncation obtusely denticulate. Clypeus with rather flat carina; weakly sinuate in profile, basal margin shallowly impressed. Frontal triangle distinct. Frontal carinae sinuate, with moderately raised margins. Sides of head in front of eyes converging towards mandibular bases in almost straight line; behind eyes, sides rounding into rather low, weakly convex occipital margin. Eyes weakly convex, in full face view not or only marginally reaching lateral cephalic outline. Ocelli lacking. Dorsum of mesosoma markedly broad and short, strongly convex in lateral view. Pronotal dorsum with humeri rounded; lateral margins converging towards deeply laterally impressed promesonotal suture. Metanotal groove indistinct; mesonotal and propodeal dorsa in lateral view forming interrupted line before rounding into vertical declivity. Propodeal spiracles prominent, situated on laterally projecting tubercles. Lateral margins of propodeum divergent, terminating in broad-based, short, subparallel, acute, spines. Petiole very narrow in lateral view with anterior face straight, posterior face very weakly convex; dorsum transversely wide, armed with very short, divergent, weakly upturned spines. Anterior face of first gastral tergite widely rounding onto dorsum.

Mandibles very finely, longitudinally striate with numerous piliferous pits. Head, mesosoma and petiole very finely and closely reticulate-punctate with characteristic opaque appearance. Gaster very finely shagreened.

Mandibles at masticatory borders with numerous, curved, golden hairs. Anterior clypeal margin medially with a few, medium length, golden setae. Several short to medium length, mostly suberect hairs on clypeus, along frontal carinae, vertex, anterior face of front coxae and venter of mid and hind coxae and femora; only a few, very short, erect hairs on dorsum of pronotum and mesonotum. Dorsum of gaster with several short hairs, more abundant posteriorly; apical segments and venter of gaster with numerous, medium length, posteriorly directed, golden hairs. Closely appressed, silvery pubescence, very



short and diluted on dorsum of mesosoma, more abundant and somewhat longer on head, propodeal declivity, metapleurae and dorsum of petiole. Abundant, mostly pale golden, closely appressed pubescence on dorsum of gaster, completely hiding underlying sculpturation; sides and venter of gaster with rather diluted, silvery pubescence.

Black; mandibles and appendages medium to dark, reddish-brown. Antennae with funicular segments progressively lighter towards apices.

*Queen.* Dimensions: TL c. 7.31-7.36; HL 1.65-1.68; HW 1.34; CI 80-81; SL 1.70-1.73; SI 127-129; PW 1.68-1.78; MTL 1.87-1.96 (2 measured).

Apart from sexual characters, very similar to worker except: clypeus in lateral view distinctly sinuate. Eyes more convex, exceeding lateral cephalic outline. Pronotal humeri with widely rounded, weakly raised margins. Mesoscutum distinctly wider than long, with widely rounded anterior margin in dorsal view; dorsum relatively low, weakly convex in lateral view; median line short, bifurcate; parapsides flat. Dorsum of mesoscutellum very weakly convex, not raised above dorsal plane of mesosoma. Propodeal and petiolar spines shorter than in worker. Sculpturation, pilosity, pubescence and colour virtually identical to those in worker.

Males in MHNG. Immature stages (larvae and pupae) in QM spirit collection.

**Remarks.** With its short and broad mesosoma, *P. tubifera* resembles *P. diversa* described above, with most distinguishing characters listed in remarks of the latter species. *Polyrhachis tubifera* is relatively common, ranging from Cape York Peninsula south to Brisbane, south-east Queensland. It occurs mostly in open eucalypt forests and woodlands, however, it is also occasionally encountered along the edges of lowland rainforests. *Polyrhachis tubifera* is evidently a ground-nesting species, with a few, rather shallowly excavated, leafmould covered nests found at the bases of trees.

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#### LITERATURE CITED

- Andersen, A.N. 2000. *The Ants of Northern Australia. A guide to the monsoonal fauna.* CSIRO Publishing, Collingwood, Melbourne 106 pp.
- Billberg, G.J. 1820. *Enumeratio Insectorum in Museo Gust. Joh. Billberg.* Stockholm, 138 pp.
- Bolton, B. 1995. *A new general Catalogue of the Ants of the World.* Harvard University Press, Cambridge, Mass. 504 pp.
- Bolton, B., Alpert, G.D., Ward, P.S. & Naskrecki, P. 2007. *Bolton's Catalogue of Ants of the World: 1758-2005.* Harvard University Press, Cambridge, Mass., CD-ROM.
- Chapman, J.W. & Capco, S.R. 1951. Check list of the ants of Asia. *Monographs of the Institute of Science and Technology, Manila* 1: 327 pp.

- Dalla Torre, C.G.de. 1893. *Catalogus Hymenopterorum, hucusque descriptorum systematicus et synonymicus* 7: 289 pp. Lipsiae.
- Donisthorpe, H. 1938. On the identity of Smith's types of Formicidae collected by Alfred Russell Wallace in the Malay Archipelago, with description of two new species. *Annals and Magazine of Natural History*. London (10) 10: 441-476.
1944. A new subgenus and three new species of *Polyrhachis* F.Smith (Hym., Formicidae). *Entomologist's Monthly Magazine*. London 80: 64-66.
- Dorow, W.H.O. 1995. Revision of the ant genus *Polyrhachis* Smith, 1857 (Hymenoptera: Formicidae: Formicinae) on subgeneric level with keys, checklist of species and bibliography. *Courier Forschungsinstitut Senckenberg* 185: 1-113.
- Dorow, W.H.O., Kohout, R.J. & Taylor, R.W. 1997. *Polyrhachis* Smith, 1857 (Insecta, Hymenoptera): proposed precedence over *Myrma* Billberg, 1820. Case 3009. *Bulletin of Zoological Nomenclature* 54(4): 236-241. December 1997.
- Emery, C. 1895. Descriptions de quelques fourmis nouvelles d'Australie. *Annales de la Société entomologique de Belgique*. Bruxelles 39: 345-358.
1897. Viaggio di Lamberto Loria nella Papuasias orientale 18. Formiche raccolte nelle Nuova Guinea dal Dott. Lamberto Loria. *Annali del Museo Civico di Storia Naturale Giacomo Doria di Genova* 18(38): 546-594, pl.1.
1898. Descrizioni di Formiche nuove Malesi e Australiane; note sinonimiche. *Rendiconti delle sessioni dell'Accademia delle scienze dell'Istituto di Bologna* (ns) 2: 231-245, figs 1-16.
1925. In, Wytzman, *Genera Insectorum*. Hymenoptera, Fam. Formicidae, subfam. Formicinae. Fasc. 183: 302 pp., 4 pls. Brussels.
- Fabricius, J.C. 1775. *Systema Entomologiae*, sistens insectorum classes, ordines, genera, species, adiectis, synonymis, locis, descriptionibus, observationibus. Flensburgi et Lipsiae. 832 pp.
- Forel, A. 1879. Etudes myrmécologiques en 1879 (deuxième partie [1re partie en 1878]). *Bulletin de la Société Vaudoise des Sciences Naturelles* 16: 53-128.
1886. Études Myrmécologiques en 1886. *Annales de la Société Entomologique de Belgique* 30: 131-215.
1895. Nouvelles fourmis de diverses provenances, surtout d'Australie. *Annales de la Société entomologique de Belgique* 39: 41-49.
1901. Formiciden aus dem Bismarck-Archipel, auf Grundlage des von Prof. Dr. F. Dahl gesammelten Materials bearbeitet. *Mitteilungen aus dem Zoologischen Museum in Berlin* 2: 1-37.
1902. Fourmis nouvelles d'Australie. *Revue Suisse de Zoologie* 10: 405-548, Geneve.
1907. Formicidae. In: Michaelsen, W. & Hartmeyer, R. (eds.). *Die Fauna Südwest Australiens. Ergebnisse der Hamburger südwest-australischen Forschungsreise 1905. Band 1(7)*: 263-310, Jena.
1907. Formicides du Musée National Hongrois. *Annales historico-naturales Musei nationalis Hungarici* 5: 1-142.
1915. Results of Dr E. Mjöberg's Swedish Scientific Expeditions to Australia, 1910-1913. 2. Ameisen. *Arkiv för Zoologi* 9: 1-119.
1916. Fourmis du Congo et d'autres provenances récoltées par MM. Hermann Kohl, Lujá, Mayné, etc. *Revue Suisse de Zoologie* 24: 397-460.
- Hung, A.C.F. 1967. A revision of the ant genus *Polyrhachis* at the subgeneric level (Hymenoptera: Formicidae). *Transactions of the American Entomological Society. Philadelphia* 93: 395-422.
- Karavaiev, W. 1927. Ameisen aus dem Indo-Australischen Gebiet III. Académie des Sciences de l'Ukraine. *Memoires de la Classe des Sciences Physiques et Mathématiques* 7(1). *Travaux du Musée Zoologique* 3: 3-52. Kiev.
- Kohout, R.J. 1988. Nomenclatural changes and new Australian records in the ant genus *Polyrhachis* Fr. Smith (Hymenoptera: Formicidae: Formicinae). *Memoirs of the Queensland Museum* 25(2): 429-438, 3 figs.
1990. A review of the *Polyrhachis vielmeyer* species-group (Hymenoptera: Formicidae: Formicinae). *Memoirs of the Queensland Museum* 28(2): 499-508, 7 figs.
1994. New synonymy of three Australian ants (Formicidae: Formicinae: *Polyrhachis*). *Memoirs of the Queensland Museum* 35(1): 135-136.
1997. Australian *Polyrhachis* and their nesting habits (Formicidae: Formicinae). *Proceedings of the International Colloquia on Social Insects*. Russian Language Section, Socium, St Petersburg (1997) 3-4: 217-222, 1 fig.
2000. A review of the distribution of the *Polyrhachis* and *Echinopla* ants of the Queensland Wet Tropics (Hymenoptera: Formicidae: Formicinae). *Memoirs of the Queensland Museum* 46(1): 183-209, 1 tbl., 4 figs.
2006. Review of *Polyrhachis* (*Cyrtomyrma*) Forel (Hymenoptera: Formicidae: Formicinae) of Australia, Borneo, New Guinea and the Solomon Islands with descriptions of new species. *Memoirs of the Queensland Museum* 52(1): 87-146, 12 figs.
2007. A review of the subgenus *Polyrhachis* (*Camponyrma*) Wheeler from Borneo with descriptions of new species (Hymenoptera: Formicidae: Formicinae). *Asian Myrmecology* 1: 7-17, 12 figs.



2010. A review of the Australian *Polyrhachis* ants of the subgenera *Myrmhopla* Forel and *Hirtonomyrma* subgen. nov. (Hymenoptera: Formicidae: Formicinae). *Memoirs of the Queensland Museum - Nature* 55(1): 167-204, 10 figs.
2012. A review of the Australian *Polyrhachis* ants of the subgenera *Myrma* Billberg, *Myrmatopa* Forel, *Myrmothrinax* Forel and *Polyrhachis* Fr. Smith (Hymenoptera: Formicidae: Formicinae). *Memoirs of the Queensland Museum - Nature* 56(1): 25-59, 8 figs.
- Kohout, R.J. & Taylor, R.W. 1990. Notes on Australian ants of the genus *Polyrhachis* Fr. Smith, with a synonymic list of the species (Hymenoptera: Formicidae: Formicinae). *Memoirs of the Queensland Museum* 28(2): 509-522.
- Mayr, G. 1870. Neue Formiciden. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 20(Abhand.): 939-996.
1876. Die australischen Formiciden. *Journal des Museum Godeffroy*. Hamburg 12(5): 56-115.
- Nielsen, M.G. 1997. Nesting Biology of the mangrove mud-nesting ant *Polyrhachis sokolova* Forel (Hymenoptera: Formicidae) in northern Australia. *Insectes Sociaux* 44: 15-21.
- Robson, S.K.A. & Kohout, R.J. 2005. Evolution of nest-weaving behaviour in arboreal nesting ants of the genus *Polyrhachis* Fr. Smith (Hymenoptera: Formicidae). *Australian Journal of Entomology* 44: 164-169, fig.
2007. A review of the nesting habits and socioecology of the ant genus *Polyrhachis* Fr. Smith. *Asian Myrmecology* 1: 81-99.
- Roger J. 1863. Die neu aufgeführten Gattungen und Arten meines Formiciden- Verzeichnisses, nebst Ergänzung einiger früher gegeben Beschreibungen. *Berliner entomologische Zeitschrift* 7: 131-214.
- Santschi, F. 1920. Quelques nouveaux Camponotinae d'Indochine et Australie. *Bulletin de la Société Vaudoise des Sciences Naturelles* 52: 565-569.
- Shattuck, S.O. 1999. *Australian Ants. Their Biology and Identification*. Monographs on Invertebrate Taxonomy 3, CSIRO Publishing, Collingwood, Melbourne 226 pp.
- Smith, Fr. 1860. Catalogue of hymenopterous insects collected by Mr. A.R. Wallace in the Islands of Bachian, Kaisaa, Amboyna, Gilolo, and at Dory in New Guinea. *Journal of the Proceedings of the Linnean Society, Zoology* 5 (supplement to vol. 4): 93-143, pl. 1.
1863. Catalogue of hymenopterous insects collected by Mr. A.R. Wallace in the Islands of Mysol, Ceram, Waigiou, Bouru and Timor. *Journal of the Proceedings of the Linnean Society, Zoology* 7: 6-48.
- Turner, G. 1897. Notes upon the Formicidae of Mackay, Queensland. *Proceedings of the Linnean Society of New South Wales* 22: 129-144.
- Viehmeyer, H. 1912. Ameisen aus Deutsch Neuguinea gesammelt von Dr. O. Schlaginhaufen. Nebst einem Verzeichnisse der papuanischen Ameisen. *Abhandlungen und Berichte des Königl. Zoologischen und Anthropologisch-Ethnographischen Museums zu Dresden* 14: 1-26, pl. 1.
- Wheeler, W.M. 1911a. Three formicid names which have been overlooked. *Science* (NS) 33: 858-860.
- 1911b. A list of the type species of the genera and subgenera of Formicidae. *Annals of the New York Academy of Sciences* 21: 157-175.
1912. New names for some ants of the genus *Formica*. *Psyche* 19: 90.
1915. Scientific notes on an expedition into the north-western regions of South Australia. Hymenoptera. *Transactions and Proceedings of the Royal Society of South Australia* 39: 805-823.
1919. The Ants of Borneo. *Bulletin of the Museum of Comparative Zoology* 63: 43-147.
1922. Ants of the American Museum Congo Expedition. A contribution to the myrmecology of Africa. Part 7. Keys to the genera and subgenera of ants. *Bulletin of the American Museum of Natural History* 45: 631-710.
1927. Chinese ants collected by Professor S.F. Light and Professor N. Gist Gee. *American Museum Novitates* 255: 1-12.
1935. Check list of the ants of Oceania. *Occasional Papers of the Bernice P. Bishop Museum* 11(11): 1-56.